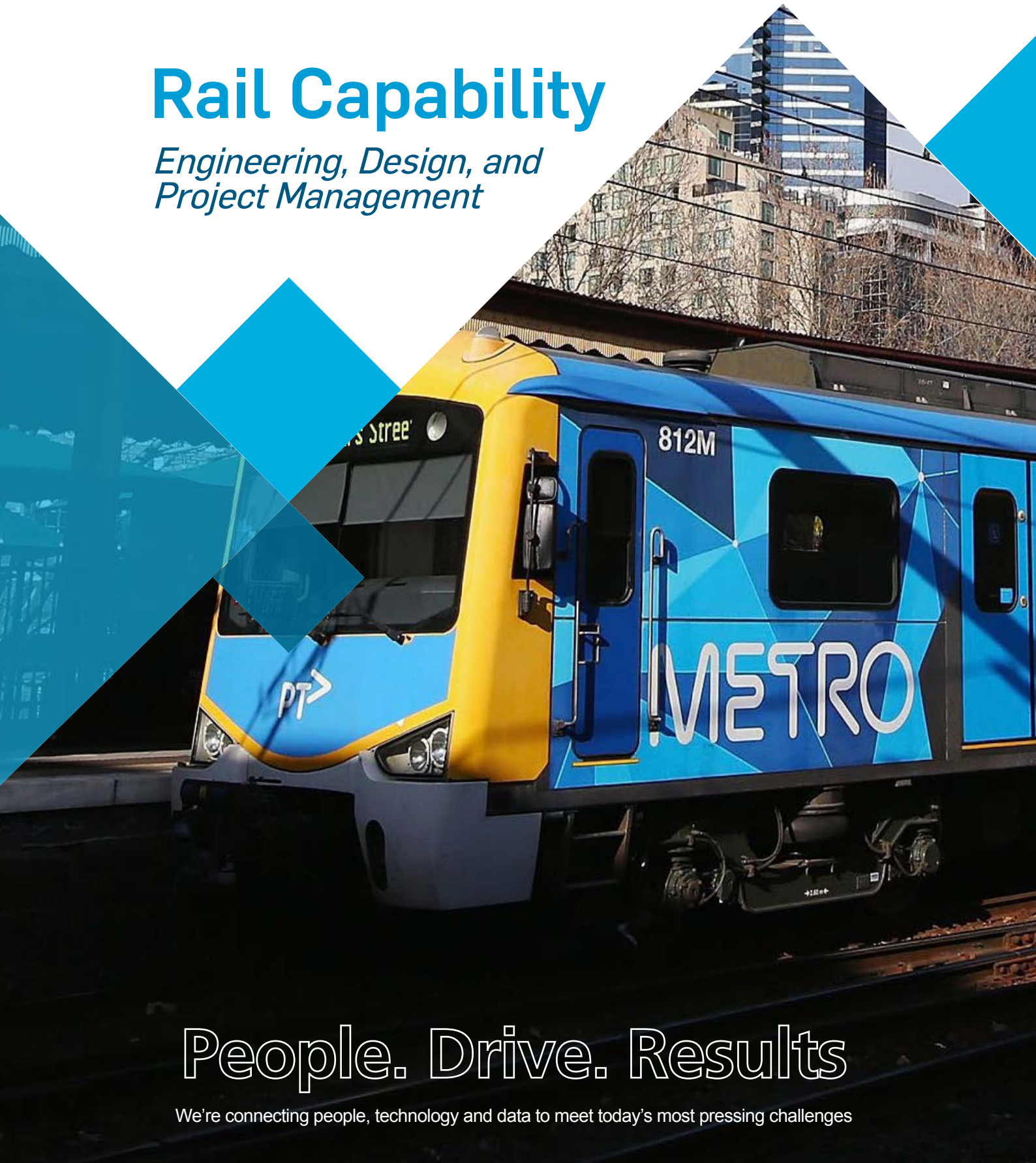
SNC·LAVALIN

ATKINS

Member of the SNC-Lavalin Group

Rail Capability

Engineering, Design, and Project Management



People. Drive. Results

We're connecting people, technology and data to meet today's most pressing challenges

About Us

Here at SNC-Lavalin Atkins, we believe we have a responsibility to help move the world forward, one step at a time.

In July 2017, Atkins was acquired by the SNC-Lavalin group of companies.

Atkins, together with the SNC-Lavalin Rail and Transit business form the Engineering, Design and Project Management sector (EDPM) of the SNC-Lavalin Group.

As one of the world's most respected design, engineering and project management consultancies, we're uniquely placed to provide professional services to solve any high speed challenge, whatever its size, complexity or location.

With over 50,000 staff worldwide, SNC-Lavalin Atkins provides technical consultancy and engineering design spanning all areas of rail.

Whether it's developing a concept for a high speed line or advising clients on how to make cities accessible and connected, our depth of knowledge and expertise allows us to provide technically excellent and sustainable solutions for both private and public sector clients.

We have a number of dedicated transportation locations around the world, allowing us to deliver, and quickly mobilise, the optimal experience, capability and resource required to realise projects, while simultaneously ensuring we remain located close to our clients.

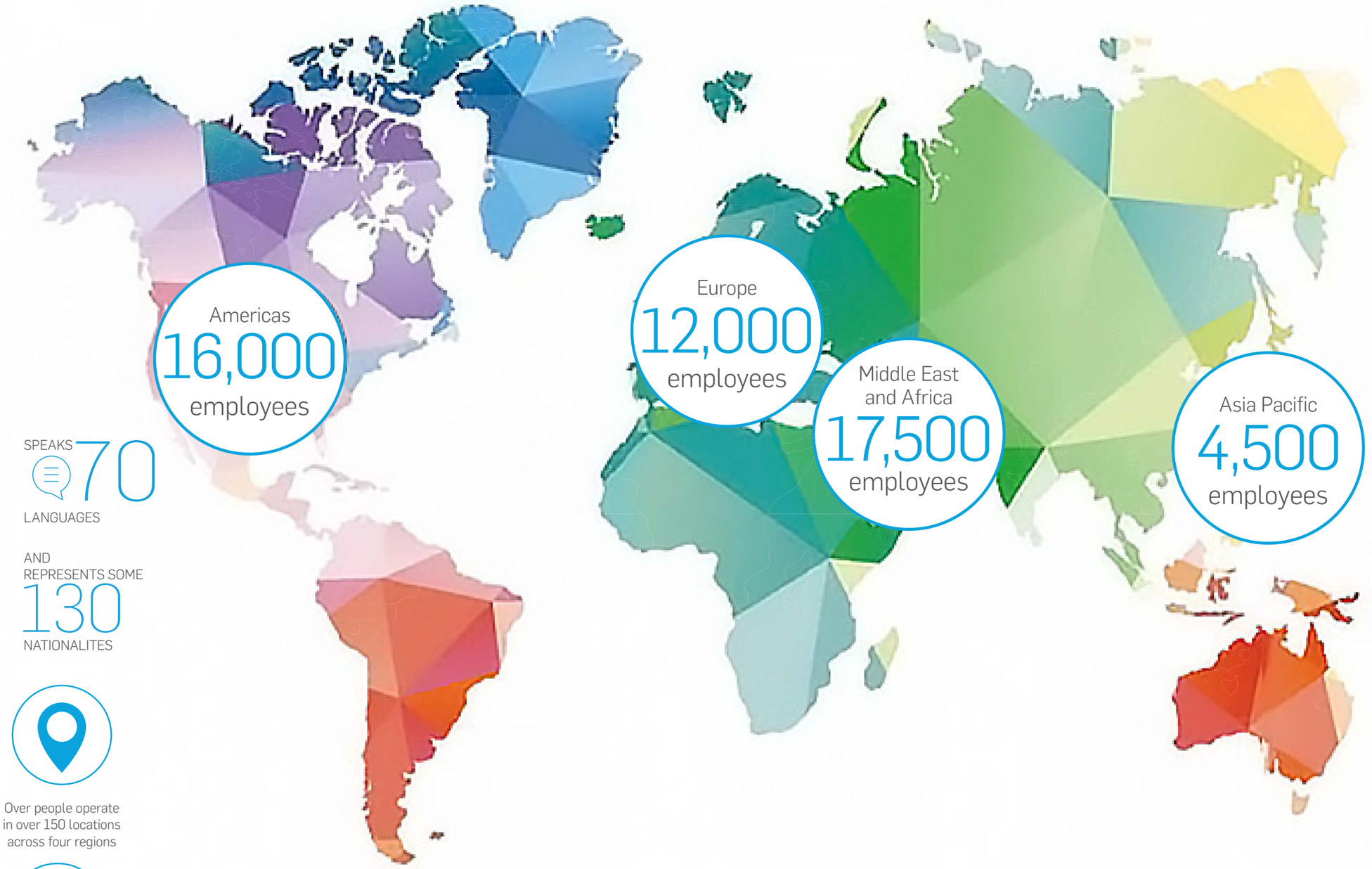
From initial feasibility studies and advice through to design and technical assurance, we're able to support our clients throughout the full lifecycle of their rail projects.

We have vast experience of working with financiers, private constructors, operators and governments. Whether it's providing concession advice, demand and revenue forecasting, risk management support or designing a new station, SNC-Lavalin Atkins is well placed to deliver innovative and effective solutions.

We care about the world, that's why we're shaping the future of transport infrastructure.

Global Experience

At a Glance



COMPRISES
50,000
EMPLOYEES

SPEAKS 70
LANGUAGES

AND WORKS FROM
OFFICES IN OVER
50
COUNTRIES

AND
REPRESENTS SOME
130
NATIONALITES

TOP 20

Top 20 global design firms

Over people operate in over 150 locations across four regions

1911

We have over 108 years of experience in delivering projects that make a difference

Turnover in excess of $10 billion

SNC-Lavalin Atkins is one of the world's most respected design, engineering and project management consultancies. In recent years, it has expanded from its historical base in traditional engineering, management consultancy and property services into related technological consultancy and the management of outsourced facilities. With over 50,000 employees worldwide, SNC-Lavalin Atkins has enormous expertise, providing both breadth and depth of knowledge in an extremely diverse range of disciplines. Our clients are varied and include governments, local and regional authorities, funding agencies and commercial and industrial enterprises. We help our clients to realise their objectives by developing and delivering practical solutions, adding value to their businesses through the application of our experience, innovative thinking and state-of-the-art technology.

SNC-Lavalin Atkins Rail

Rail has been at the core of our design services since we were established more than 75 years ago; our first rail project was completed in 1945, involving the creation of critical infrastructure links for the UK's rail network.

Since then, we've been established as one of the major consultants to the rail industry by playing key roles in the development of major networks across the world including Europe, Middle East, Asia Pacific and North America.

Today, rail is a critical part of any region's plans to create sustainable, people-centric cities of the future which enable and encourage people to adopt active, healthy lifestyles as part of integrated urban communities.

In the following pages you'll learn more about us and our work, and I hope you'll gain a sense of our excitement to be helping our clients to design and deliver rail projects which will play a key role in the future development globally.

"Working with our clients and partners, we believe that the scale of what we can accomplish together is greater than anyone can imagine. "

Matthew Hinchcliffe
Director, Rail Market

About SNC-Lavalin Atkins

Who We Are

Founded in 1911, SNC-Lavalin is a global fully integrated professional services and project management company and a major player in the ownership of infrastructure. From offices around the world, SNC-Lavalin's employees think beyond engineering. Our teams provide comprehensive end-to-end project solutions – including capital investment, consulting, design, engineering, construction management, sustaining capital and operations and maintenance – to clients across the EDPM (engineering, design and project management), Infrastructure, Nuclear, Clean Power, and Resources businesses. SNC-Lavalin acquired Atkins on 3 July 2017.

SNC-Lavalin's Atkins business is one of the world's most respected design, engineering and project management consultancies.

Together, SNC-Lavalin, a global fully integrated professional services and project management company and Atkins help our clients plan, design and enable major capital projects, and provide expert consultancy that covers the full lifecycle of projects. We strive to build strong relationships by understanding the challenges our clients face, sharing their vision and helping them transform potential into reality. Our world-class expertise at scale delivers value to our clients, and the depth and breadth of our capabilities sets us apart from the competition.

Asia Pacific at a Glance

- Over 40 years of history in region
- Over 2,800 staff located in 6 countries
- Working with public and private sector clients
- Strong track record in transport, infrastructure, property and urban development and energy sector
- Comprehensive end-to-end solution across project life cycle, powered by our multidisciplinary capabilities
- Global expertise with local knowledge
- Increasing emphasis on digital design delivery and digital asset management
- 3rd in the top 225 international design firms (ENR 2018)

The Values We Provide

- Comprehensive end-to-end solutions for property, urban development, transport, infrastructure and energy projects across the project life cycle
- Deep local knowledge combining with our global multidisciplinary expertise and experience to support our clients with context-sensitive solutions
- Best-in-class consulting, digital design, engineering, delivery and digital asset management solutions provided by over 2,800 people in-region

Rail & Transit

Throughout the Asia Pacific Region, we advise and support public and private sector clients with the delivery of complex, outcome-focused projects, building relationships based on understanding, integrity and collaboration. As the digital world increasingly converges with the physical, we harness digital technology to drive best-in-class project delivery, manage assets effectively and efficiently, enable new business models, maximise the value from data and create safe and secure infrastructure fit for the future.

Our Services

From blueprint to delivery, we connect people, technology and data to deliver outstanding project outcomes for our clients on time and on budget.

- ***Consulting & advisory***
  Data-driven insights and consultancy.
- ***Intelligent networks & cybersecurity***
  Innovative agile solutions for networks and cyber.
- ***Design & engineering***
  Data-driven solutions from concept to feasibility to design.
- ***Procurement***
  CAD$7 billion worth of goods and services procured annually.
- ***Project & construction management***
  Outstanding project management across the entire lifecycle.
- ***Operations & maintenance***
  Maximised value for assets that stands the test of time.
- ***Sustaining capital***
  Operating, maintaining and creating improvements.
- ***Decommissioning***
  Safe and environmental solutions for assets' end of life.

KEY STATS

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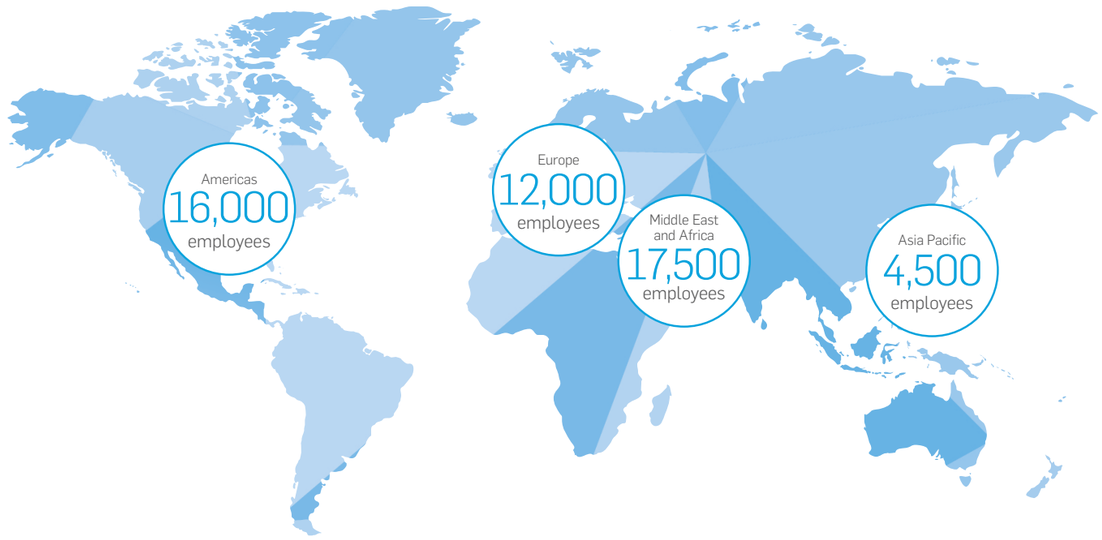
NATIONALITES

Our local teams have global reach



As a world-leading engineering and project management company, we are always looking to the future and evaluating how best to execute projects that thrive today and will continue to do so tomorrow. Our ability to achieve this so successfully is grounded in our heritage of delivering excellence that stretches back over a century.

From our 50 offices around the world, we connect people, technology and data to shape the future of our industry and the world around us. It's how we generate the knowledge, the ingenuity and the drive to meet so many of today's most pressing challenges – from population growth and increasing transportation needs, to climate change. And because we cover everything from blueprint to delivery, across the entire lifespan of a project, you can count on us for a client experience that is smoother, smarter and more efficient. At SNC-Lavalin Atkins, we're not just embracing change – we're driving it.

With expert local knowledge and the ability to draw upon the group's breadth and depth of global technical expertise, our team has been able to successfully deliver some of the region's most complex and challenging property, urban development, transport, infrastructure and energy projects for our public and private sector clients across the project life cycle.

At the heart of our approach is our multidisciplinary capabilities; enabling our comprehensive end-to-end solutions that shape the future of cities and infrastructure.

In today's ever changing and challenging world, we believe the application of technology digital engineering and digital asset management will benefit our clients in many aspects, from enhancing efficiency and clarity from early stage to achieving higher safety and quality standards, and maximising value to clients.

Our leading global expertise and local knowledge, combined with multidisciplinary support from our Global Design Centre in India, offer the best-in-class consulting, design, engineering and delivery solutions, enabling our clients to achieve their desired outcome and ultimately their success in what they do.

Ethics & Compliance

We set a clear goal to become the global benchmark for ethics and compliance in our industry and a clean-business role model worldwide. Our compliance program consists of three pillars, Prevent, Detect and Respond. This comprehensive system helps ensure all business activity across our Company is carried out in accordance with the highest standards of ethics and compliance.

20
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What we do

Engineering and Design
SNC-Lavalin Atkins' world-renowned engineering and design capability spans from masterplanning and architectural design to systems engineering, and meets all the key global rail standards

Rolling Stock
We help clients procure, specify, design, operate and enhance their train fleets to meet passengers' needs

Strategic Advice
We are trusted to help our clients make informed and technically robust strategic choices in government and business

Due Diligence
Our reputation means that we are trusted to provide genuinely independent feasibility and commercial advice

Environmental Planning
Our environmental engineering expertise helps our clients optimise rail design and environmental compliance

Concession and Franchising Advice
We are world leaders in helping authorities and bidders let and win competitions, and optimise policy and financial rail choices

Cost, Demand and Revenue Forecasting
We are experts in helping authorities and bidders let and win competitions, and optimise policy and financial rail choices

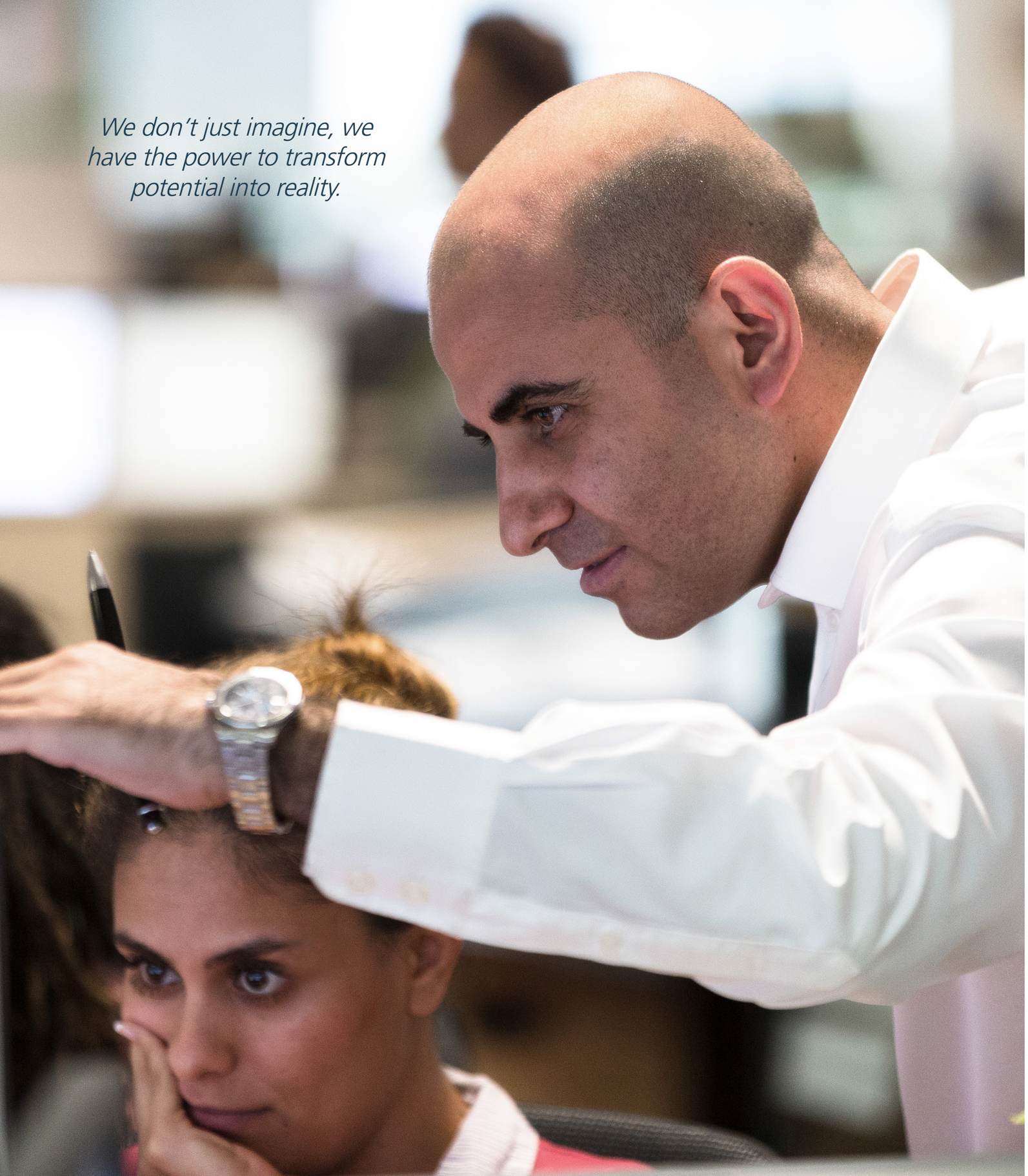
Operational Planning
Our capability includes from timetables, plans and models that detail the operational delivery of high speed rail services ensuring punctuality and reliability

Project and Programme Management
We offer the full range of project management services. Our team delivers all facets of a project according to schedule and client expectations, because they are backed by one of the most powerful and versatile project management systems in the industry.

Track and route alignment
Our multidisciplinary expertise means that we can help clients blend cost, demand and engineering to select the best alignment, route and network

Transport Planning
We help our clients optimise their business cases for high speed rail and related infrastructure, drawing in global experience

Systems and Technical Assurance
We offer a range of skills to help railways plan, select, design and build efficient high speed rail systems



For people, by people

Transport networks that really work are not about rail, roads, airports and ports – they’re about people.

Rail, and metro stations in particular, are very often the hubs of the neighbourhoods in which they are situated. They are a gathering point, a nexus and a means of modal interchange.

In key cities, we’re helping our public and private sector clients to understand the opportunities presented by their rail projects. We work in partnership through all aspects of planning, design and construction in order to drive value, innovation and sustainable thinking.

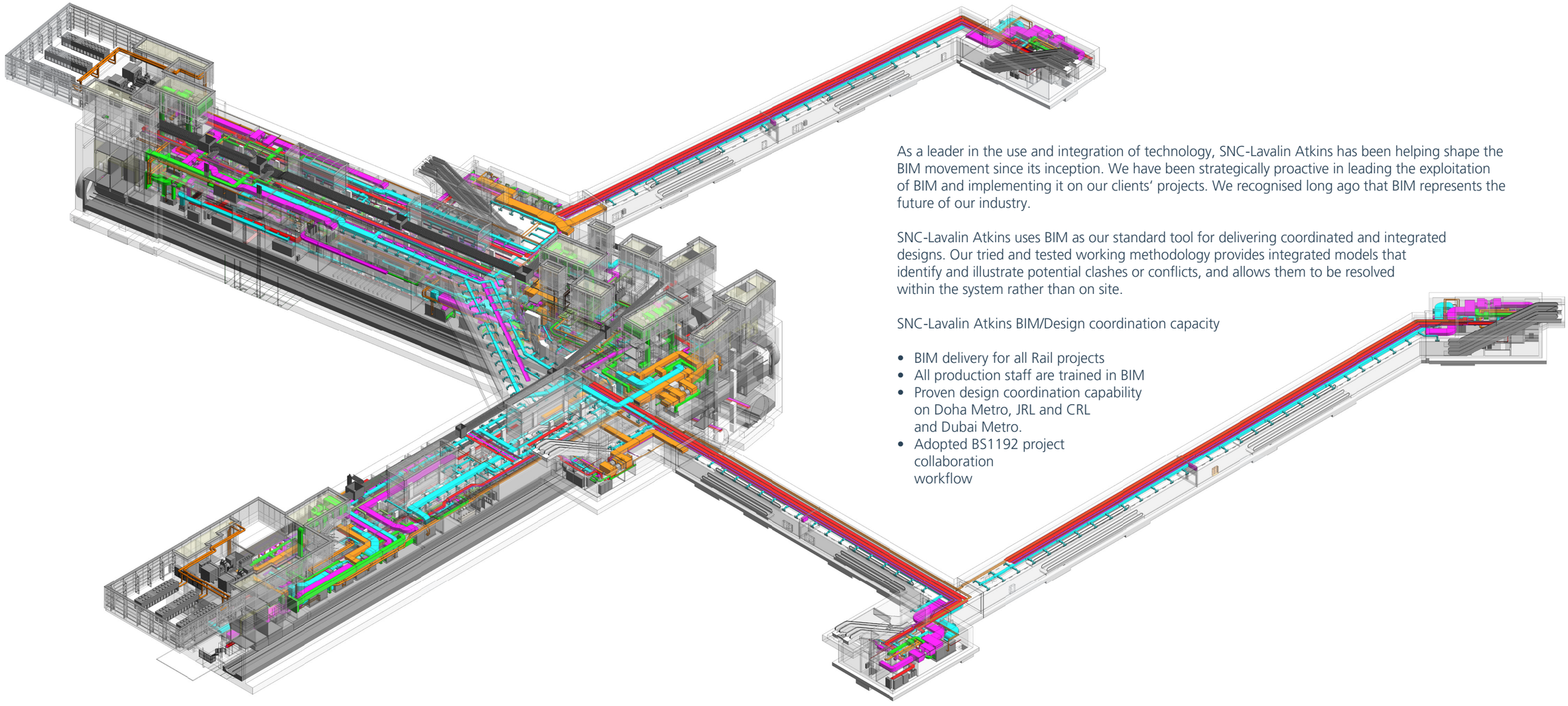
Fundamentally, we always focus on helping our clients to deliver projects which meet the needs of end users, and which therefore play a part in improving their cities and neighbourhoods for the long term – socially, economically and environmentally.

Our core design services include:

Highways Engineering
Building Services
Utilities Engineering
Landscaping
Civil Engineering
BIM
Acoustics
Structures
Architecture
Pedestrian Modeling
Fire Engineering
Ground Engineering
Sustainability
MEP
Rail Systems
System Assurance

BIM

Building Information Modelling (BIM) has redefined project delivery in the design and engineering industry, changing everything from the tools we use, the skills required, and the way we work with clients.



As a leader in the use and integration of technology, SNC-Lavalin Atkins has been helping shape the BIM movement since its inception. We have been strategically proactive in leading the exploitation of BIM and implementing it on our clients' projects. We recognised long ago that BIM represents the future of our industry.

SNC-Lavalin Atkins uses BIM as our standard tool for delivering coordinated and integrated designs. Our tried and tested working methodology provides integrated models that identify and illustrate potential clashes or conflicts, and allows them to be resolved within the system rather than on site.

SNC-Lavalin Atkins BIM/Design coordination capacity

- BIM delivery for all Rail projects
- All production staff are trained in BIM
- Proven design coordination capability on Doha Metro, JRL and CRL and Dubai Metro.
- Adopted BS1192 project collaboration workflow

SNC-Lavalin Atkins acknowledges its responsibility to enable a sustainable future. We accept that we have a leadership role in influencing industry and our partners, as well as incorporating sustainable solutions within our operations and the services we provide.

Sustainability

Sustainability is a core component of healthy cities covering economic, social and environmental issues.

SNC-Lavalin Atkins has a responsibility to put sustainability at the heart of our business strategy through our market leadership role, our operations and the services we provide. we recognise that our operations can make an important contribution to a more sustainable world. It is our leadership responsibility to both improve our own sustainability performance through the way we run our business and to influence others. This will be through the alignment of our strategic advice, design, construction, asset life-cycle operations and services aligned with our business strategy and plans.

Sustainability is embedded into our business culture, from the way we behave to the way we design. It is the search for deep value, within our products, our systems and most importantly for people. At the heart of this is a commitment to an integrated design process that prioritises cost-effectiveness over both the short and long term.

SNC-Lavalin Atkins offers a range of services, supported by bespoke research and analysis, to enable the identification and implementation of sustainability and climate change solutions at both the masterplanning and project delivery stages.

Our sustainability principles:

- **A society for our future** – inspiring the next generation; investing in communities; developing sustainability knowledge and skills, and creating a healthy, safe and secure workplace.
- **An environment with a future** – supporting a low carbon economy; demonstrating respect for the environment through resource efficiency andpreventing pollution; and protecting and improving ecosystems.
- **A responsible business of the future** – influencing and supporting sustainable economic growth with strong governance, integrity and accountability; being part of a global business while recognising the responsibility and the importance of providing local services without compromising future generation's business needs.

Rail Integrated Services

From project delivery in the confines of an operational railway, to maximising the value of control and signalling assets, our solutions are value focused. We're helping to empower our customers to change the face of rail travel.

We're experts in all technical railway disciplines, with the proven skills and decades of knowledge required for today's sustainable rail and transit projects.

Our team offers comprehensive consultancy and advisory services, and our clients include railway authorities, manufacturers, operators and contractors.

We provide services on every type of railway and asset through the whole lifecycle of new or existing railway projects. Our experts develop concepts then design, build and finance our clients' projects. We can also help operate, maintain and enhance every asset, making us the partner of choice.

Bringing project management, technical and operational expertise together across the project life-cycle

Rail Services

Globally our 2,000 railway systems engineers, rail operators, and railway consultants including staff based regionally across Asia Pacific gives us unparalleled expertise covering all aspects of railway systems and operations planning, design, implementation and whole life support.

SNC-Lavalin Atkins expertise extends through railway operations & maintenance, rail alignment & permanent way, signalling & control systems, a.c. & d.c. electrification, telecommunications and rail vehicles.

We are wholly independent of any system supplier, and are therefore able to provide totally impartial advice to owners, operators, contractors or suppliers.

Our Rail Services are summarised under the following areas:

Systems Engineering & Management
Systems project management and project controls
- Project management procedures and project controls for systems works
- Systems programme development
- Technical and commercial management of systems suppliers and contractors
- Systems design management
- Construction management & supervision

Systems Design engineering
- Design engineering (concept, preliminary and detailed design) of permanent way, overhead line power supply, signalling, control systems, and telecommunications
- System simulation & modelling (e.g. line capacity & power system)
- Specialist engineering studies (e.g. stray current)
- Development of performance and functional specifications
- Systems tender documentation
- Fully integrated application design Independent checking and certification
- Independent checking of third party design for any railway system including safety critical systems;
- Independent checking and certification of signalling interlocking / control tables
- Independent checking of software based control systems to SIL4

Systems Integration
- Complex electrical systems integration support (e.g. signalling, rolling stock, electrification)
- Earthing design, management and coordination
- Alignment coordination
- Combined Services / Structural E&M Coordination (CSD/SEM)
- Functional interfaces design, hazard analysis and management
- Interface design development, planning and testing

Operations & Maintenance (O&M)
- Operations and Maintenance planning
- Operating strategy and business planning
- Operational layout design and testing/simulation for mainline/ depot
- O&M resource planning
- O&M budgetary costing

Operational Readiness Support
- O&M documentation needs analysis
- Structured development of operating rules, procedures, instructions and O&M manuals
- Training needs analysis
- Staff competency assessment
- Development of training materials
- Delivery of structured bespoke training courses

Incident and Accident investigation
Independent investigation
- Evidence gathering and securing (including chain of custody procedures)
- Recovery of data from event monitoring or voice recordings
- Identification of investigation critical documents
- Specialist technical investigation services and advice
- Reliability and failure investigations
- Performance improvement monitoring

Asset Management and Engineering
- Asset condition assessment and benchmarking
- Asset management best practice
- Life extension opportunities
- Development of asset management systems in accordance with international standards

Technical Due Dilligence
- Lenders technical advisory services
- Design and delivery, programme and operations review
- Payment mechanism review, cost estimation and review
- Contract review

1 Singapore MRT, Systems Testing, Singapore
2 MTR Tsuen Kwan O Line, OHL Design, Hong Kong
3 Taiwan High Speed Rail, Control Centre Development, Taiwan
4 KCRC Light Rail, Design & Site Supervision for Railway Systems, Hong Kong
5 Sydney Clearways, Operational Reliability, Australia
6 West Coast Main Line Resignalling, United Kingdom

Australian Rail

Rail & Transit Overview

Rail & Transit

We deliver seamless, personalised passenger experiences, and optimise operations by reducing risks through decades of experience in engineering excellence. We're helping to empower our customers to change the face of rail travel.

We consult on, design, construct, operate and maintain the intelligent, integrated systems required to deliver smarter cities and better transportation. Whether our clients need a specific service, expertise or an end-to-end approach, we're here to help.

We are experts in all technical railway disciplines, with the proven skills and decades of knowledge required for today's sustainable rail and transit projects. Our team offers comprehensive consultancy and advisory services, and our clients include railway authorities, manufacturers, operators and contractors.

We provide services on every type of railway and asset through the whole life cycle of new or existing railway projects. Our experts develop concepts then design, build and finance our clients' projects. We can also help operate, maintain and enhance every asset, making us the partner of choice.

Global Transport Project Highlights

- South Island Line (East), Hong Kong
- Shatin-Central Link, Hung Hom Station, Hong Kong
- Klang Valley Mass Rapid Transit Line 1, Malaysia
- New Rolling Stock Program, Victoria, Australia
- Parramatta Light Rail, Australia
- Bergen Light Rail, Norway
- HS2, United Kingdom
- Crossrail, United Kingdom
- Doha Metro Gold Line, Qatar
- Dubai Metro, UAE

Our Expertise

- Operations Planning, Integration and Readiness
- Operational Reform
- System Integration
- Rolling stock acquisition
- Maintenance strategy
- Light Rail

We bring value to network operations

We provide services on every type of railway and asset through the whole lifecycle of new or existing railway projects. Our experts develop concepts then design, build and finance our clients' projects. We can also help operate, maintain and enhance every asset, making us the partner of choice.

- We are investing to grow our transport business in Australia.
- We have the skills and the reach back in transportation.
- We know that the market has periodic shortages of skills and quantum of people.
- We are growing the core business in size with local staff plus experts from other Countries and reach back to India, UK, Middle East and Canada.
- We have completed numerous NSW rail projects.
- We have one of the largest rail transport businesses with the breadth and depth to support the entire value chain.

Australian Rail Projects

Sydney Metro, O&M Advisor, Systems Integration

Our roles include:

- International benchmarking and review of operations plans, payment mechanisms, emerging technologies and augmentation strategy
- Establishment of the client System Integration team
- Development of brownfield and TSOM systems specifications including asset management

Parramatta Light Rail, Stage 1 & 2 Technical Advisory

Our roles include:

- Concept of operations, operational standards / protocols and operational performance model;
- Updated Customer Services Specification;
- Specified system functional, technical and operational perf requirements inc operational and customer systems; Defined stabling and maintenance facility requirements

Rail & Transit Overview

Western Sydney Airport Metro, Feasibility and Reference Design

Our roles include:

- Definition and development of the rail corridor alignment and associated system designs to support the railway business case for the new metro line
- Definition of interfaces with the Badgerys Creek Airport precinct
- Development of the reference operations plan for opex costs

Canberra Light Rail: O&M / Testing & Commissioning

Our roles include:

- Development of the operator's functional requirements for fleet, systems and infrastructure including alignment, stops, depot, staffing, signalling etc
- Safety, security and risk management for light rail operations
- Testing and commissioning support for tele-comms, control systems and LRVs. Expert advice on LRV production advice

Sydney Trains: Strategic Maintenance Advisor

Our roles include:

- Review of maintenance practices and activities within Sydney Trains and the L3C contract.
- Review of performance of the L3C contract and identification of opportunities to improve and optimize performance.
- Recommendations as to how the L3C contract should be evolved to suit the changing needs of Sydney Trains

Cross River Rail, Brisbane, O&M, Technical Advisor

Our roles include:

- Operational Readiness and Operations Timetable Planning
- Concept of Operations (ConOps)
- New Generation Rolling Stock Interface Management
- System Integration and System Assurance strategy and team

New Rolling Stock Program, PTV, Victoria: Technical Advisor

Our roles include:

- Business Case and Concept Design development for new trams, regional trains and associated infrastructure
- Procurement Options / Specifications for new Rolling Stock
- Control Systems Specifications

Gold Coast Light Rail: O&M Advisor

Our roles include:

- Operations Advisory Services during both the planning and procurement phases for Stage 1 and Stage 2 and provided technical support during the delivery phase of Stage 1
- Contract compliance and technical interface management
- Development of the operating and maintenance strategy for the system; leading the development of the customer service strategy

Diversity and Inclusion

Rail & Transit

Because it matters

At SNC Lavalin Atkins we are proud of our diverse and dedicated workforce. Our employees speak 70 languages, represent 130 nationalities and work from offices in more than 50 countries. Their diversity is a key strength in helping us understand and meet client needs worldwide.

We are dedicated to:

- Promoting inclusiveness in our policies, practices and business relationships
- Proactively recruiting and onboarding candidates from a diverse and talented applicant pool
- Increasing the total percentage of women in engineering, management and senior management positions
- Reinforcing the awareness of diversity and inclusion through education and training

Our scope

Diversity and Inclusion priorities are defined at a global level, in alignment with the company's business strategy and values. To support our growth operations and embed the fundamental values that drive us, we have put forward the 3 following action pillars as the basis of any specific action plans established regionally:

- Recruitment and onboarding
- Development and advancement
- Engagement and sharing

We have adopted a ***regional implementation*** approach in which each geographic region or business area can tailor the plan to its respective local realities.

Each region is therefore leading its own Diversity and Inclusion initiative, while benefitting from the sponsorship of a member of the executive committee and the support of the local HR and Communications leadership team.

Also each region, has its own Diversity and Inclusion Regional Business Network, composed of employees and leaders representing different sectors and roles.

In 2017, SNC-Lavalin Atkins welcomed more than 350 graduates and apprentices to help them kick-start their design, engineering and project management careers in the UK. The new intake of these early-career colleagues includes Atkins' highest ever number of female graduates and apprentices. This tremendous achievement further strengthened diversity and inclusion inside Atkins. We were proud to receive the Diversity Employer of the Year Award from the Ichthys LNG project, near Darwin, Australia, for the number of aboriginal and female apprentices we had on site in 2017.

Our strategy

Our strategy is straightforward: at SNC-Lavalin Atkins , Diversity and Inclusion are everyone's business.

We strongly believe that all employees and managers have the responsibility to raise awareness about Diversity and Inclusion and the power to take action to impact the organisation's performance and growth.

Our commitment to Diversity and Inclusion starts at the top and is cascaded through the company, in particular to middle managers who promote ownership in their core businesses, by encouraging role-modelling and holding accountable their managers who make talent decisions.

Employees, on a daily basis, can contribute to advancing the Diversity and Inclusion cause by treating their colleagues, clients, providers or other business partners with respect, consideration, curiosity and an open mind.

Closing the gender gap

All dimensions of diversity are important to us and we strive to create a culture that accepts, embraces and values each of them. However, given the low percentages of women in comparison with men in critical roles for our business, such as professionals, managers and senior managers, our current focus consists in increasing the percentage of women within these roles.

Our objective is to increase representation of women in professional, management and senior management roles to 20% as a minimum.

Diverse groups make better decisions and better decisions lead to better business results.

Programme Management Office

Our PMO operating model is built on service excellence and a tailored approach.
Our objectives are always aligned to the client needs recognising that we consistently provide a model of excellence of PMO services. We achieve this by implementing and operating a best practice integrated PMO approach, tailored to support the client in delivering its objectives and exemplifying its core values.

Programme Management Office (PMO)

The Programme Management Office has become the industry standard for a central support function within a business responsible for defining, ensuring compliance with, delivery standards and methodologies for projects. The PMO delivers consistency of approach, is a central hub for information management and brings efficiencies from economies of repetition. We work with our clients to help re-imagine their PMO business model, process and culture to support better decision making and insight. From exploiting new technologies to adopting new and innovative ways of working, we support smarter programme delivery while improving our clients PMO skills and capabilities to manage effective and controlled change.

Our Global Vision, Ethos & Values

Our focus is on delivering great outcomes for our clients. This sets the tone for our people to think beyond the technical capability provided and to instead think about the best outcomes for the projects and clients. This can only be achieved through the following key areas:

- Collaboration and working as an integrated team with clients and suppliers
- Being open and honest and acting with integrity
- Simplifying complexity and managing ambiguity
- Building a lasting legacy for clients
- Having continual improvement at the heart of what we do

Our capability

Operating at the forefront of the transport sector, we deliver our services around the world in over 50 countries, on projects of every size and scope. Our global capabilities allow us to provide our clients with the programme and project management capabilities supported by our global engineering and technological solutions needed to ensure success in an ever-changing world.

Our PMO services cover the full spectrum of program and project support requirements, from advisory and development to project delivery and post-project operational readiness. Locally within Australia, our PMO experience is already being applied on key projects:

Inland Rail Project, where we have mobilised a PMO team and are providing programme management support services as part of a continual improvement programme.

Brisbane Airport, where we are providing advisory, programme management support and operational efficiency services.

Within Australia, SNC-Lavalin Atkins offers a unique perspective as PMO transport professionals:

- A local team of transport industry experts with global capability to deliver service excellence.
- Over 40 years delivering world-class programs with innovative solutions and outstanding strategies.
- Deep understanding of the complex operating environments of transport.
- Creative and cost-effective solutions that align with clients' goals and aspirations.
- Access to a local & global resource pool of professionals through our locally based Centre of Excellence for PMO services.

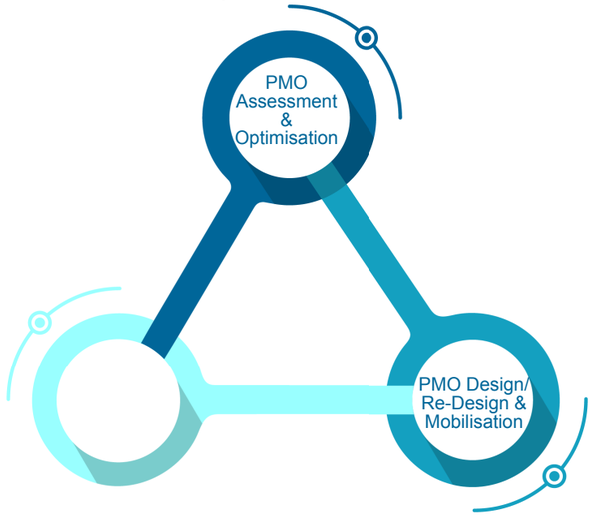
We maintain great relationships across the project through our PMO operating model

Our teams are led by leaders of our business who:

- Have a strong understanding of the importance of maintaining relationships both internally and externally.
- Demonstrate collaborative behaviors both on projects and internally at SNC-Lavalin Atkins.
- Harness major programme learning from within an integrated team environment.
- Work within an integrated competency framework that provides clients with confidence in our ability to deliver.
- Operate within a performance management programme that enables SNC-Lavalin Atkins to obtain feedback on our own service delivery performance and behaviours.

Our PMO operating model is built on service excellence and a tailored approach

We achieve this by implementing and operating a best practice integrated PMO approach, tailored to support the client in delivering its objectives and exemplifying its core values. We work with clients to understand their needs and provide PMO services that deliver expected outcomes at the specific point in the PMO lifecycle.



PMO operating model dimensions

Our approach is always to use the appropriate methodology to define requirements and provide an objective framework for assessment and improvement. We structure our PMO operating model based on three dimensions:

Process excellence:

The end to end process of managing the performance and commercial baseline.

Functional excellence:

Observing best practice principles in each of the controls and commercial disciplines.

Architecture excellence:

Establishing the right people, the right organisation structure, the right independent guidance and the right systems so that performance transparency leads to performance accountability and successful delivery.

SNC-Lavalin Atkins' Programme Management Office – Client focused through implementation of best practices and a service orientated approach

PMO objectives

Our objectives are to always align to our clients' needs recognising that we consistently provide a model of excellence of PMO services that:

Implements effective governance & control

Our approach to governance and processes will be to ensure that we help clients strike the right balance with level of control and decision making to be applied and deliver the right projects in the right order, the right way by the right people. We implement consistency across the projects environment through the implementation of the governance framework, processes and systems. We also assist with resources optimisation, ensure that roles and responsibilities are clear and that the PMO can flex in size and function to service changing demands over time.

Deliver programme and project control

We recognise a cornerstone of PMO management is applying effective cost, schedule, risk and change control via the right systems and processes. This is firstly underpinned by establishing baselines for scope, cost, schedule and other project elements and then supported through effective controls monitoring, reporting and change management.

Has the right business intelligence

There are tremendous opportunities to be had from navigating and harnessing "Big Data". We can help implement the right strategies and Business Intelligence technologies to provide historical, current and predictive views of data in intuitive, interactive formats. This supports and enables effective monitoring of projects and decision making by the right people.

Builds an enterprise legacy

An effective PMO considers software and systems at enterprise level with current and future needs in mind. We can implement integrated systems architecture, logical models and digital solutions that leave a lasting legacy of tangible benefits and added value for clients.

Has integrated frameworks

We are acutely aware of the potential for silos in PMO environments. We focus on integrating project management frameworks across organisational and team boundaries and introduce business processes across the project lifecycle that encourage a team approach to outcomes.

Asset Management & Maintenance: A process-based approach

Overview

Rail & Transit

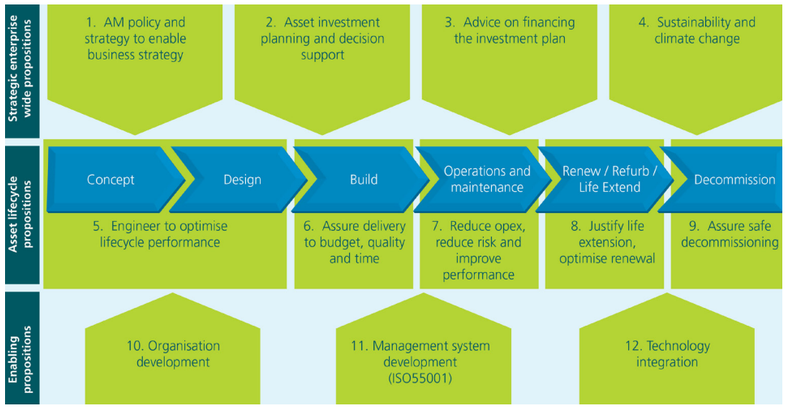
Our strategic asset management services enable organisations to manage their assets and systems in a sustainable way to optimise their performance and minimise risk and expenditure over the lifecycle of assets.

SNC-Lavalin Atkins is at the forefront of providing transport infrastructure asset management advice and services to private and public sector clients across multiple sectors.

Our extensive experience and understanding of the Rail sector enables us to provide tailored solutions throughout the asset lifecycle, enabling our clients to address significant challenges.

Our Services

Through our advisory and digital asset management services we are able to offer clients tailored support, expertise and industry leading tools covering all aspects of asset management including:



- Strategic advice and leadership
- Asset management decision making and optimisation
- Asset investment planning, valuation and business case development
- Change Management and capability development
- Commercial and procurement support
- Data collection and management
- Digital tools, applications, platforms and databases
- Performance management and continuous improvement

SNC-Lavalin Atkins' performance evaluation and improvement services include:

- Development and monitoring of KPIs
- Performance assessments of assets including rolling stock and maintenance depots;
- Incident and accident investigations;
- Expert witness services;
- Root cause analysis;
- Evaluation of preventative measures to avoid failures;
- Development of improvement plans or refinements to strategy;
- Assessment of legal and statutory compliance.

We fully understand the busine for implementing asset management and have tailored our value propositions to address these drivers. Through our advisory and digital asset management services we are able to offer clients tailored support, expertise and industry leading tools covering all aspects of asset manageme

Technical Services

Our Capabilities

Vehicle Services

- Technical Advisors during procurement, design, manufacturing and testing & commissioning
- Specification preparation
- Testing & commissioning support
- Compliance reviews against standards
- Condition assessments
- Overhaul & upgrade specifications

Specialist Engineering

- Structural and dynamic performance of vehicles and bogies
- Design modification and compliance management
- Structural integrity, durability and life extension studies
- Design for crash survivability and maintainability
- Noise and vibration assessments
- Expert witness and accident investigations

Signalling Systems

- Signalling compatibility testing
- Development and implementation of signalling asset maintenance strategies
- Independent review and/or supervision of field installation of signalling equipment
- Technical and safety assurance services
- Hands-on design of signalling systems via our Global Design Centre

Communication & Control Systems

- Operational concept development and planning for depots, trackside assets and command and control centres
- Systems engineering and project assurance for complex Greenfield and Brownfield system upgrades
- Cyber security technical advisory
- Threat and vulnerability assessments

Our Team

- Chartered mechanical and electrical engineers
- Expertise in heavy rail, light rail, operations, cyber security, vehicle dynamics, signalling, rolling stock design and compliance
- Based in Sydney, Melbourne, Brisbane and Perth

Overview

Rail & Transit

SNC-Lavalin's Technical Services team provides engineering solutions, services and specialist advice for the complete life cycle of a project, from procurement, design, manufacturing, testing & commissioning, operating & maintaining, upgrades and modifications, through to retirement. We provide engineering support to designers, manufacturers, owners, operators, maintainers, both private and government, local and international. Our team has proven project experience highlighted below:

New Generation Rollingstock

SNC-Lavalin were engaged as Technical Advisors to the DTMR. This included managing all aspects of the design review process; maintaining an overseas assurance team in India; managing the planning and execution of the type and routine test program; and establishing and implementing the requirements compliance process and the acceptance process for each Set.

High Capacity Metro Trains

SNC-Lavalin were engaged by CRRC to assist with bogie design verification requirements. This included preliminary dynamic verification; preparation of a design requirements matrix; preparation of test procedures for the validation test programmes of proof load testing, fatigue life testing and on-track dynamic performance testing; and witnessing of the tests.

Sydney Growth Trains

SNC-Lavalin were engaged by Downer to undertake the signalling compatibility testing. This included developing a testing and compliance strategy; leading all testing activities, data analysis & modelling to assess harmonics; and proposing recommendations including endorsing that the Set can operate under its own power on the network.

Canberra Light Rail

SNC-Lavalin are engaged as the Operations and Fleet Advisor. This includes providing specialist advice on the integration of the Meridian central control system with the SCATS urban traffic control system; providing advice on managing operational interfaces with buses and active travel networks; providing advice on wire-free operation; reviewing the definition design and participating in risk workshops.

System Engineering & Safety Assurance

Rail & Transit

Project Delivery Services

SYSTEMS ENGINEERING & SAFETY ASSURANCE

SNC-Lavalin Atkins' Systems Engineering & Safety Assurance team brings together expertise from key areas of project delivery to provide an integrated approach throughout the project life cycle.

SYSTEMS ENGINEERING

Systems engineering and assurance encompasses a diverse range of skills necessary to ensure that a transport system delivers its business and operational targets. Each individual system and subsystem – whether they are major system elements such as a signalling system, or rolling stock – must be designed, interfaced and integrated to achieve the required functionality and performance.

Our systems engineering approach, whether delivering a single aspect or complete system solution, takes a holistic system level perspective throughout the whole project lifecycle to ensure that the emergent properties of the system (such as capacity, availability and functionality) are delivered in accordance with the baseline requirements.

Our systems engineering perspective of assets and operations ensures that we provide wholly integrated systems solutions when providing specialist advice whether during initial concept, design, development, implementation or commissioning stages.

Our approach is to provide our clients with the best available system functionality and operational efficiencies whilst meeting all statutory requirements. It also enables us to provide our clients with levels of assurance demanded in the preparation of concept safety cases and risk assessments, and independent verification and validation.

Our expertise can be summarised thus:

Systems Design Engineering

- Design engineering (concept, preliminary and detailed design)
- System simulation and modelling
- Specialist engineering studies
- Development of performance and functional specifications
- Systems tender documentation
- Fully integrated application design
- Systems integration
- Complex electrical systems integration support

- Alignment coordination
- Functional interfaces design, hazard analysis and management
- Interface design development, planning and testing

SAFETY ASSURANCE

SNC-Lavalin Atkins' approach to safety assurance and risk management is founded on a thorough understanding of current safety requirements and our ability to develop innovative solutions. Advice is provided from a proactive and creative viewpoint that treats safety not as a constraint for proposals, but a positive benefit to facilitate the introduction of new arrangements in the safest way.

Our capabilities encompass all the disciplines required to minimise client risk exposure and ensure safety approvals based on solid and varied experience in all transportation sectors.

Our capabilities span the range of safety and assurance activities including:

- Development of safety cases and safety arguments
- Independent verification and validation of safety assurance activities
- Risk assessment and risk workshop facilitation
- Risk Modelling
- Development, maintenance, review and audit of safety management systems
- Independent auditing of management systems and asset condition and compliance
- Accreditation support and guidance

In addition to our Systems Engineering and Safety Assurance services, SNC-Lavalin Atkins continues to offer independent safety advice to clients.

Independent Safety Assessment

Independent Safety Assessment (ISA) involves making a judgement, separate and independent from any system design, development or operational personnel, that the safety requirements for the system are appropriate and adequate for the planned application and that the system satisfies those safety requirements.

As projects and systems become more complex, there is a need for additional assurance that a system or product is safe. SNC-Lavalin Atkins is a recognised leading authority in delivering ISA services for Safety Critical products and project applications. Our clients include railway authorities and suppliers of systems and system components.

Geoscience and Environment

Overview

Founded in 1911, SNC-Lavalin Atkins is a global fully integrated professional services and project management company and a major player in the ownership of infrastructure. Our Australian Environment and Geoscience team offers a full suite of services from environmental auditing, environment site management, planning and approvals, environmental compliance and due diligence review, contaminated site assessment, waste characterization and recovery, hazardous material survey, geochemistry, and geological and geotechnical engineering supported with Geographic Information System (GIS) and 3D model capabilities.

Our Team

Our team of 18 members consists of qualified and experienced environmental consultants, environmental specialists, project managers, environmental auditors, engineering geologists, geotechnical engineers, geoscientists and technical writers with local and international experience and a practical understanding of construction practices and constraints.

We understand the complex environmental, stakeholder and social issues facing major projects in the transport sector. Our in-depth knowledge and experience in a wide range of environmental fields allows us to take a comprehensive and integrated approach to all projects. Our experts have experience not only in working with one another, but also in working with authorities, community groups, designers, constructors and owners. This means that we can fully integrate into any project team, and that we have a solid understanding of all aspects of a project.

Environmental Planning and Approvals

Our Areas of Expertise

- Preparation of environmental management documents
- Environmental licence applications and permits
- Site environmental management
- Stakeholder liaison and management
- Preparation of specific plans required as part of the EPL, Contract Deed or the Minister's Conditions of Approval
- Technical advice and support
- Soil and water quality management
- Strategic advice and technical reviews
- Sustainability assessments
- Implementation, monitoring and reporting
- Project management
- Feasibility and constraints analysis
- Environmental risk assessments.

Key Projects Experience

Inland Rail
The Parkes to Narromine section is one of 13 projects that completes Inland Rail. SNC-Lavalin Atkins was responsible for managing an approvals team to prepare the Construction Environmental Management Plan and its suite of sub plans, as well as other approvals and environmental documents such as the management of the Environment Protection Licence application process and interface with the Environment Protection Authority.

Sydney Metro North West Rail Link
SNC-Lavalin Atkins was responsible for coordinating and managing the update and preparation of the Construction Environmental Management Plan (CEMP) for the Phase 2 works of the Operation, Trains and System (OTS) contract. The Sydney Metro Northwest (North West Rail Link) work also included the main CEMP and all the environmental management sub plans.

Parramatta Light Rail Stage 1
Parramatta Light Rail Stage 1 will connect Westmead to Carlingford via the Parramatta CBD and Camellia with a two-way track spanning 12 kilometres. SNC-Lavalin Atkins were engaged by CPB Contractors to support the construction environmental planning and approval process. This includes the preparation of the Construction Environmental Management Plan and its associated sub-plans. It was crucial to ensure the Conditions of Approval were met during this phase to successful deliver the project.

Western Sydney Airport
SNC-Lavalin Atkins was engaged by the CPB Contractors-Lend Lease JV to coordinate and manage the preparation of the associated environmental management plans related to the Western Sydney Airport Early Earthworks package. We worked collaboratively with the multi-disciplinary project team and utilised the Infrastructure Sustainability Council of Australia (ISCA) and NSW Transport for NSW Sustainable Design Guidelines (SDG) to establish a project specific sustainability framework.

Geo-environmental Services

Our Areas of Expertise

Site Investigation
- Preliminary and detailed site investigations
- Test pit, drilling and geophysical investigation
- Pavement investigations
- Drone driven inspections, surveillance and monitoring

Contaminated Land and Hazardous Material
- Health and ecological risk assessments
- Remedial Action Plans,
- PFOS and PFAS investigations and remediation
- Hazardous material surveys – including asbestos and audits
- Management and control plans.
- Waste characterisations, recovery exemptions and re-use

Soil Management
- Sediment and erosion control plans
- Acid sulfate soils and rock
- Site rehabilitation – including mines

Water Resources and Water Quality
- Flood modelling and water balances
- Hydrogeology investigations and modelling of flow and contaminant transport
- Water quality investigations and water treatment
- Geo-chemical modelling

Geotechnical Engineering
- Site classification
- Geotechnical assessments
- Foundation design – including deep piles
- Retaining wall design
- Pavement design
- Earthworks and material suitability assessment
- Shoring and dewatering design
- Ground and slope improvement.

Engineering Geology
- Geological mapping
- Landslide assessments
- Soil and rock slope stability analyses
- Geo-hazards and forensic investigations.

Construction Support
- Foundation inspections
- Slope inspections
- GIS and 3D modelling support
- Inspection of excavations, support methods and retaining walls
- Level 1 supervision of earthworks
- Geotechnical instrumentation and ground monitoring.

Key Projects Experience

Sydney Light Rail
SNC-Lavalin Atkins provided strategic advice and ongoing technical support for a wide range of environmental services for the project. Specifically, direction for spoil re-use / waste characterisation program, various specialist studies and investigations, sampling and analysis plan development, characterisation of PAH and metals leachate attributes of spoil, development of geotechnical specification for topsoil reconditioning to meet rehabilitation specification, groundwater modelling and impact assessment for civil works dewatering, acid sulfate soil issues, geotechnical and stabilisation agent appraisal, various water quality investigations and evaluations and preparation of a validation report for a site under statutory audit.

Western Sydney Airport – Rail Feasibility Design
SNC-Lavalin Atkins was awarded with the Rail Feasibility Design for the new second Sydney Airport. The engagement investigated the delivery of cost effective rail corridor options within the airport site. The Geo-science team provided technical interpretation of data, preparation of ground model and concept design for elevated structures, cut and cover tunnels, station boxes, earthworks and cut slopes.

Sydney Metro City & Southwest
SNC-Lavalin Atkins was engaged as the strategic advisor and consultant for contaminated sites, acid sulfate soils and rock, waste recovery, water treatment and pre-construction baseline marine sediment assessments. Specific work areas included: port lease areas at Blue Point, Barangaroo and Clyde, Sydney Harbour tunnelling work sites and Crow Nest Station. Contaminants of concern included: acidity, heavy metals, PFAS, petroleum hydrocarbons, phenols, pesticides and herbicides. SNC-Lavalin Atkins was also responsible for coordinating and managing the environmental management plans and approvals.

Operations Advisory Services

Rail & Transit

Overview

Operations Advisory provides a comprehensive range of services to assist with planning and delivering successful transport project outcomes. The Operations Advisory team who are implementing change or new business strategies to be delivered into new or existing operational environments.

Our people, approach and tools ensure a client's strategy is implemented in a well-integrated manner which focuses on minimizing value leakage. This is achieved through our outcome focused approach including:

- ***Strategic Support for Decision Making:***

  We provide clients with strategic (network, commercial, operations and technical) thought leadership in the definition of detailed strategy and associated complex decision making.
- ***Local Experts with Global Knowledge:*** We provide the client with knowledge and experience from international transport projects and solutions to support complex changes across people, process and technology
- ***Assurance of Complex Solutions:*** We provide clients with independent advice via respected industry experts (global and local) to assure complex decision making and ensure benefits realisation is secured in line with the plan.

Our Services

SNC Lavalin Atkins' Operations Advisory services include:

- Transport Planning
- Customer Experience & Operations
- Network Strategy

Operations Advisory knowledge, experience and services are complemented by SNC Lavalin Atkins' global capabilities and services in the transport and infrastructure sectors.

An Integrated Approach

Adopting an integrated approach from project inception we deliver better operational, technical and functional outcomes including:

Our Operations Advisory Approach

- ***Customer Led:***
  We provide the Client with confidence that high level customer requirements will be translated into actual end-user experiences through our excellent stakeholder engagement and stakeholder management tools integrated with our human centered design approach
- ***Operationally Integrated:***
  We provide clients with concept of operations that are based on successful operable solutions using knowledgeable people with broad modelling, technical, system integration and operational experience
- ***Better Value Solutions:***
  We use our global experience to ensure that the definition, design and delivery of transport projects are based on best practice, tested solutions and global lessons learnt; this provides assurance of success and higher value outcomes for the client.

Transport Planning

Transport Planning provides multi-modal transport planning services to assist governments, agencies and the private sector in the planning, options analysis and review of land use and transport infrastructure projects. Our transport planning services include:

1. Strategic appraisal at project inception stage including TODs
2. Value capture
3. Business case and cost modelling
4. Cost benefit appraisal for public sector schemes
5. Operational Modelling
6. Peer review

Customer Experience & Operations

Our Customer Experience and Operations team in-cludes highly experienced SMEs with a broad spectrum of operational knowledge and capabilities including:

- ***Operational cost models and performance regimes:*** We are able to provide advice and support from global experts in the development of operational cost models and performance regimes.
- ***Concept of Operation***
- ***Concept of Operation and Maintenance:***
  We understand operations and the importance of the detail when bringing people, process and technology together to deliver successful, resilient and reliable services.
- ***Customer Focused Outcomes:***
  We are customer outcome focused and have the skills sets to support this approach including Customer Experience SMEs, Human Factors SMEs, industrial designers and Human Centered Design capabilities.
- ***Method of Operational Integration and Readiness (MOIR):***
  We are system integrators understanding the importance of all the parts that contribute to the delivery of operations day in and day out.

  and Maintenance: We understand operations and the importance of the detail when bringing people, process and technology together to deliver successful, resilient and reliable services.

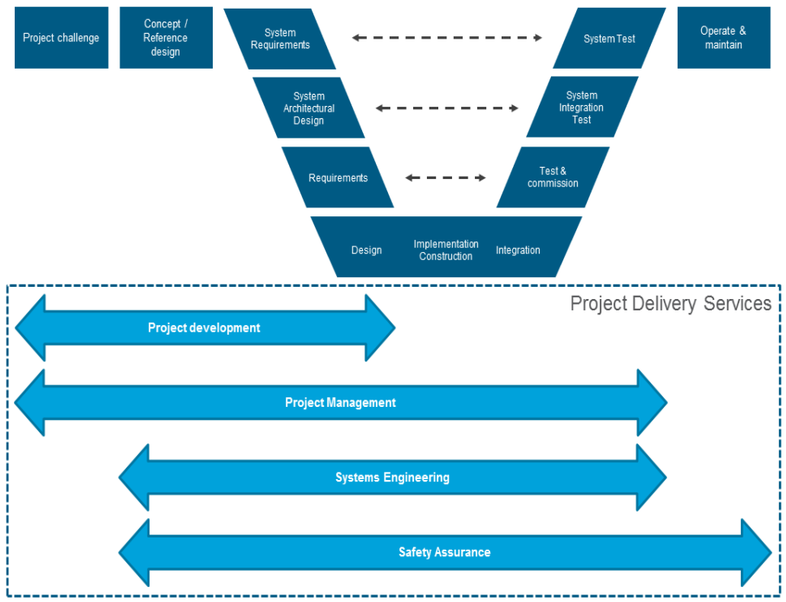
Network Strategy

SNC-Lavalin Atkins has a highly-respected network strategy and operations modeling capability in Australia, with additional capacity overseas. The Network Strategy team are able to model both freight and complex passenger networks, as well as light rail systems.

SNC-Lavalin Atkins holds multiple licenses for industry-leading OpenTrackTM and RailSys operational modeling software and has delivered many operational modeling studies covering a wide range of applications. The Network Strategy team is supported by specialist engineers with expert knowledge in fields such as railway infrastructure, signaling, OHL traction and rolling stock performance.

To provide best value to clients the team have developed a number of standalone tools using their thorough understanding of the challenges of pathing freight within busy passenger networks. The tools enable the team to carry out in-depth assessment of operational risk across networks and deliver well informed and optimised outcomes to the client.

Project Delivery Services



OUR CAPABILITIES

SNC-Lavalin's Project Delivery Services team puts integration at the heart of its approach, bringing project management, technical and operational expertise together across the project life-cycle. Project integration is essential to successful project delivery and, when properly performed, introduces an approach of collaborative working to successfully combine the technical and systems elements of a solution. This in turn ensures that all stages in a project run smoothly, from project inception through to delivery and operation.

SNC-Lavalin Atkins' Project Delivery Services team is an established project integrator, with experience of the full project lifecycle from feasibility planning, through to investment and economic assessment, project development and procurement, and then moving into delivery and completion. We manage suppliers and advisors (either our own or third parties) to coordinate planning and, oversee design, construction, maintenance and operations.

Our team provides leadership and specialist support through a focus on the following three key areas:

Project Development

Providing advice and implementation support on the most suitable approach for initiating projects and setting up a framework for successful delivery, services include:

- Project definition
- Project feasibility
- Optioneering
- Business case drafting
- Commercial / transaction support

Project Management

Driving delivery and providing the common thread through a project to deploy the key elements of inProject at the relevant stage, services include:

- Project Management
- Efficient and effective deployment of resources
- Track and monitor progress
- Identifying and managing project delivery risks
- Provide periodic reporting on project status, time and cost
- Project controls
- Visualization set up
- Project assurance and governance

Systems Engineering & Safety Assurance

Implementation of a systems engineering approach including:

- Systems integration review and implementation
- Operational risk management
- Safety assurance support
- Accreditation strategy and delivery
- Security and cyber security assessments
- Independent assurance

The benefits of having us as a project integrator is our ability to bring clients and suppliers together with delivery, technical and operational expertise to enhance whole-life value whilst reducing cost, improving quality, innovating and delivering effectively.

SNC-Lavalin Atkins is currently delivering a blend of key management, technical and advisory services across the life cycle of complex programs and projects in New South Wales, Queensland and Victoria, including high profile initiatives such as Cross River Rail and Sydney Metro Greater West.

Project Development Services

Project Delivery Services

Rail & Transit

PROJECT DEVELOPMENT

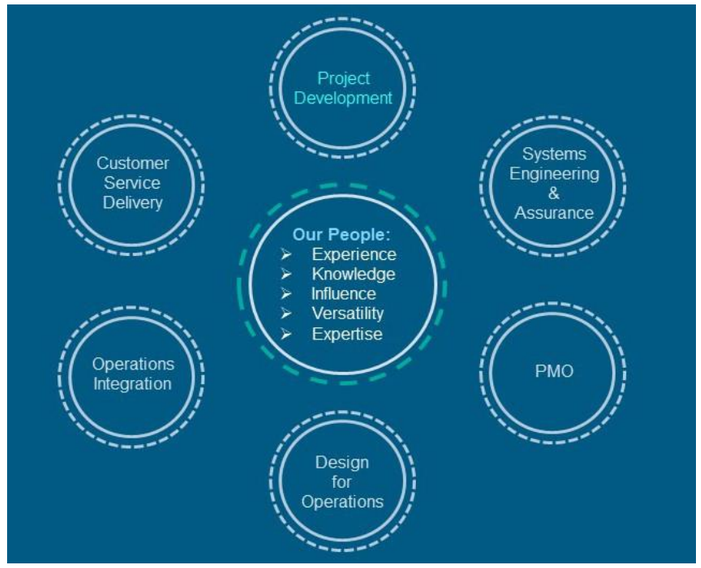
SNC-Lavalin Atkins' Project Development Team is focused upon setting up projects for success from the outset. We help clients define and initiate project investments to maximise the probability of success and reduce risk in the later stages.

Our experienced team understands the complexities of transport projects and provides the benefit of setting up a framework for early integration of requirements for delivery, operation and maintenance. We provide a seamless service, using an integrated approach to deliver the right project outcomes for the client and end users.

The Project Development team can lead the early technical, project management and operational input to project definition, feasibility analysis and options analysis. As
a project progresses we provide business case support through our own team of technical subject matter experts and via our network of expert industry partners. Services include:

- Project definition
- Operations Concepts
- Project feasibility
- Optioneering
- Business case drafting
- Commercial / transaction support

Our team has extensive major project experience and, for projects selected to be delivered, we can provide local and global expertise for the development of commercial and transaction strategies. Supported by the Project Management, Systems Engineering and Safety Assurance areas of our Project Delivery Services team we can then provide integration support and continuity as a project progresses into the delivery phase.



SNC Lavalin Atkins' approach ensured a disciplined yet collaborative, flexible working environment that resulted in an integrated and assured set of design deliverables. The implications of every design element on the overall 'whole-of-life' costs were front of mind in the development of all the options, in particular the implications on O&M cost. Option evaluation focused upon implications affecting broader infrastructure such as the Airport and surrounding roads.

This included the impact on operations and maintenance of the infrastructure in addition to the impact on long term airport expansion. Building Information Management (BIM) tools played a critical role in engaging stakeholders, and underpinned our interdisciplinary and safety reviews. Critical elements such as safety, customer movements, modal integration, airport terminal integration, emergency evacuation and station ventilation were all considered as part of the development of the design options. SNC-Lavalin Atkins also undertook construction stage planning including interfaces with the future road network.

PROJECT EXPERIENCE

Western Sydney Airport Feasibility Study

The Australian Government is building the Western Sydney Airport, planned to commence operations in the mid 2020's. In December 2016 the Department of Infrastructure and Regional Development (in collaboration with TfNSW) engaged a consortium of design consultants, led by SNC-Lavalin to deliver a Rail Feasibility Design for cost and construction programming for rail options through the Airport site.

Project Management Services

Project Delivery Services

Rail & Transit

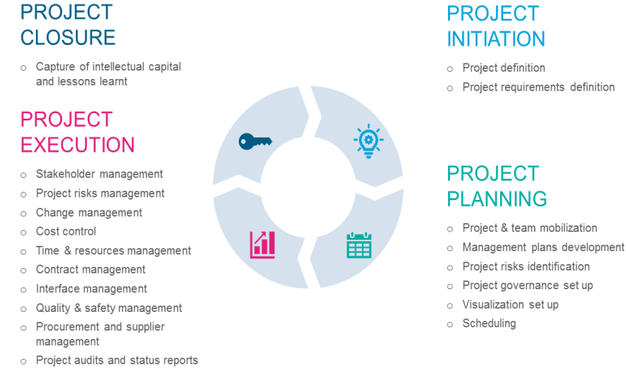
Project Management

Effective project management is essential throughout the project life-cycle to ensure successful delivery of high-quality solutions which meet the business objectives within defined budgets and timescales. This requires management and control of all processes from requirements capture and analysis to validation, delivery and maintenance.

SNC-Lavalin Atkins' Project Management Services team have a wealth of experience in managing and delivering successful projects across the transport industry. We can provide a complete project management team to take full responsibility for all aspects of a client's project, or supplement existing teams with specialist project management consultancy in specific areas such as project planning, risk management and change management.

SNC-Lavalin Atkins utilise well-established project management processes, systems and tools to ensure consistency and rigour across the wide variety of scale and scope of projects undertaken. Our project managers have extensive experience of the transport industry and cover full cycle of activities shown above from Initiation through Planning and Execution to Closure:

SNC-Lavalin Atkins' team of highly skilled and experienced project management professionals will ensure the success of our clients' projects and the achievement of the identified business objectives.



Project Management Process

Our Experts

Robert Smith, MBA, MEng(Hons), CEng, MIMechE, MAIPM

Robert is a Chartered Mechanical Engineer and experienced Project Manager with over 20 years railway consulting experience gained through delivering engineering and rolling stock procurement assignments for a number of local and international clients.

Robert started his rail career in the UK and, since moving to Australia in 2000, has undertaken work across Australia, Thailand, India, Malaysia and China. Rob has worked predominately on the client side of rolling stock procurement contracts and has experience with a wide range of vehicle types and operations. This has included suburban DMU and EMU rolling stock, fully automated metro vehicles, light rail vehicles and a variety of freight and maintenance rolling stock.

William Wachsmann, BSc, BE (Hons), MBA

William has a strong background in engineering and managing complex engineering projects. He has over 30 years' experience in both the private and public sectors, and applies strategic thinking and commercial imperatives to improving corporate outcomes.

William understands the challenges of introducing, maintaining and enhancing new capital equipment and infrastructure, from the point of view of both the contractor and client. He is experienced in managing new build projects as well as refurbishments and has demonstrated his ability to work with all stakeholders to achieve on-time and on-budget performance.

Beatriz Rituerto-Prieto, MBA, MEng (Ind)

Beatriz is the Head of the Project Management Services team within SNC-Lavalin Transport Asia Pacific. Aside from leading her team, she continues to directly provide consultancy services to a range of clients.

Beatriz possesses wide ranging project management skills gained through working with multiple stakeholder groups in different projects and countries. She has worked in both the client and manufacturing side of rolling stock procurement contracts. Beatriz adapts quickly to different challenges, teams and work environments to efficiently manage and coordinate internal and external partners.

Rail Design and Engineering

Rail & Transit

Overview

With an extensive team of railway professionals we are committed to delivering excellence in every aspect of rail design and engineering. The success of our strategy is based on the international skills, best practices and experiences we have gained through delivering complex multidisciplinary urban projects globally.

As a market leader in the design and development of transportation infrastructure, we work with national and local governments, highways authorities, private developers and agencies worldwide to help our clients deliver the infrastructure that will shape the future of transport.

Our transportation planning and design consultancy work involves developing solutions to enhance our clients' ability to meet customer needs. From initial feasibility studies and preliminary design, through to funding arrangements, contract procurement and supervision of on-site delivery, our technical design teams have worked with a variety of clients to develop the right solutions to service network needs.

We provide engineering and project design for all aspects of rail infrastructure, systems, communications and operations. Our longstanding expertise in the transportation sector encompasses the design of:

- Railways and supporting systems
- Highways and roads
- Bridges
- Tunnels
- Ports and maritime facilities
- Airports
- Town and city centre improvements such as traffic management, transport interchanges, bus, pedestrian and cycle schemes.

From pure signalling design to the programme management of multidisciplinary projects, our experienced design and engineering teams provide innovative solutions that span every discipline in the light rail, mass transit and heavy rail markets. Our teams integrate rail engineering experience, common sense and modern technology to produce innovative infrastructure designs tailored to client and project needs, to deliver cost-effective outcomes.

Our services are best illustrated through unique but inter-related work streams, including the following.

- Rail structure, vehicle and system asset management
- Rail-infrastructure (structure, architecture and building services)
- Tunnel ventilation and fire & life safety strategy and design
- Design, development and construction for overhead lines and conductor rails
- Signalling and telecoms
- Rail, strategic rail and rail-related consultancy
- Rail vehicle design, engineering and certification
- Rail property / infrastructure modelling
- Multi-disciplinary rail project delivery
- Systems assurance and safety

Our Global Design Framework (GDF) enables us to seamlessly move and coordinate design work across

technical and geographical boundaries and has achieved BIM ISO 19650 certification in the UK.

The GDF is a framework for design, guiding projects from bid to handover.

- It will assist all design projects to achieve ISO19650 (BIM L2)
- It consists of 82 Standards, Methods and Procedures (SMP)
- It aligns design around the world

The development and prosperity of population centres across the globe are dependent on the existence of efficient transport networks. Increased demand, advances in design and technology and investment in the sector has seen rail become a leader in sustainable transport, marrying both carbon concerns with prudency.

Critical Transport Links

Efficient links between towns, cities and countries has never been more critical. Where business and industry is the heartbeat, sustainable transport networks form the arteries. Although the two are interdependent, they are both vital to cultural and economic growth.

Rail Engineering and Systems Design

SNC-Lavalin Atkins is a leader in rail engineering and systems design, providing expertise to clients from our experience and in-depth knowledge of the rail and engineering domains.

From the development and maintenance of existing systems to the implementation of new schemes, we help clients through the entire project lifecycle to ensure that maximum value and outcomes are achieved.

Our rail services are delivered via a multidisciplinary workforce located in the UK, Scandinavia, China, the Middle East, India and the USA.

Expertise

We provide a broad range of consultancy services to the rail sector. Our experienced teams provide innovative solutions that span every discipline in both the light and heavy rail markets.

Reliable Rail Infrastructure

Reliable infrastructure is the foundation of any railway system, with design and construction underpinning optimal performance and reliability.

As a leading consultant in the rail sector, clients entrust us to successfully deliver their infrastructure projects, ensuring deadlines are met and costs are controlled.

Carrying Passengers, Moving Goods

Rail vehicles must be designed to suit their intended purpose. For passengers they represent the most significant element of their journey experience, while for freight handlers they constitute an integral part of the logistics chain.

From certification services to full design consultancy, our vehicle specialists provide innovative and effective solutions in response to the business needs of vehicle manufacturers, maintainers, owners and operators.

Looking After Your Assets

The rail sector is characterised by a range, longevity and complexity of assets found in few other industries. For all stakeholders, it is vital that these assets are managed effectively to ensure the rail systems remain safe and reliable.

By adopting a coordinated and systematic approach to asset management, we maximise the value, performance and return on our clients' investments.

Under One Roof

Whether housing rolling stock or protecting commuters from the elements, a well-designed property is critical to any operational railway.

Our property capability encompasses stations, transport interchanges, depots, lineside buildings and associated developments. We take pride in our ability to offer clients a comprehensive suite of services by combining traditional design work with diverse skills from across the wider Atkins Group.

Construction Planning

- Through the Early Contractor Involvement in the project Atkins have worked closely with Contractor and Client to help devise realistic and appropriate construction plans and sequencing
- We have identified to our client alternative track alignments and construction sequencing, compared to the early scheme development, which will both simplify construction while bringing operational benefits to the client early in the programme.
- This collaboration is crucial for this complex project to be a success as it is to be implemented in a highly constrained site, surrounded by high density urban areas, on one of the busiest, nationally significant rail corridors in the UK.

Design to Construction

Automation – Standardised Delivery

The traditional approach to Railway Overhead Contact System (or OCS) Design is manually intensive and prone to human error due to the complex component configurations and re-use of design data in several design processes.

Within the modern digital age it is essential to improve and optimise how design is carried out.

Solution

Develop an innovative suite of digital tools to improve the design process of railway electrification overhead line equipment with the aim to significantly increase productivity rates.

The integrated solution also provides the following benefits:

- Faster responsiveness to design changes
- Automatically contribute to a 3D BIM model (Level 2) for contractors
- Reduce design and site errors
- Be agnostic to equipment range and easily scalable to exploit new markets
- Deliver multiple OCS projects in tandem making full use of in-house technical expertise

Benefits

- 25% reduction in standard OCS Layout Plan production times.
- 40% decrease in standard Cross Section production time.

Building Information Modeling (BIM)

BIM has redefined project delivery in the design and engineering industry, changing everything from the tools we use, the skills required, and the way we work with customers.

We recognised long ago that BIM represents the future of our industry and have been strategically proactive in leading the exploitation of BIM and implementing it on our customers' projects.

The need to be better connected

End-to-end working means all parties getting involved from the outset: from feasibility onwards, from pulling together the business case to designing the details, from engineering, construction to operation, then from maintenance to decommissioning. Thus giving any major project a better chance of smoother delivery, on-time and on-budget than having different players coming in at every stage. It's a collaboration from start to finish.

Specialist Engineering

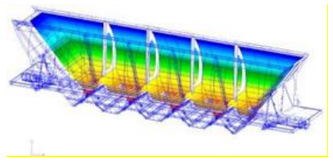
Rail & Transit

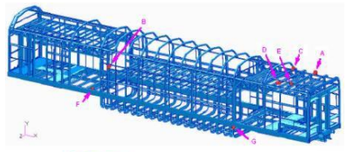
Technical advice for your business

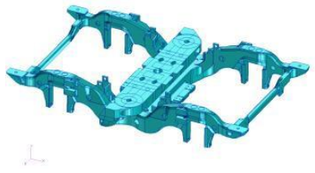
The global rail industry is facing ever more demanding challenges related to their rolling stock and infrastructure assets - particularly in the fields of safety, performance, longevity and reliability. We provide our clients (asset owners, operators, maintainers, manufacturers, regulatory bodies, infrastructure managers, leasing companies, finance houses, equipment suppliers and other key organisations) with value for money specialist engineering and advisory services in those fields.

Our industry professionals use proven methods, reliable processes and leading edge technologies to provide our clients with first-class advice for:

- Structural and dynamic performance of vehicles and bogies
- Design modification and compliance management
- Independent verification and 3rd party audit of design work
- Commissioning and Certification
- Structural integrity, durability and “life extension” studies
- Forensic review of “what went wrong” and development of mitigating strategies
- Design for crash survivability and maintainability
- Noise and vibration assessment (environmental and structural)
- Ride, derailment and gauging studies
- Expert witness and accident investigations







Where we can help

There are many aspects of vehicle behaviour to consider during design, operation and upkeep:

- Performance under extreme operational conditions (proof and dynamic loads)
- Environmental and passenger comfort conditions (noise and vibration)
- Influence and consequences from changes in operating conditions
- Integrity under abnormal operational conditions (crashworthiness)

International perspective, local presence

- Clients have access to the full breadth of knowledge and experience from subject matter experts based in Australia, NZ, the UK and Sweden.
- Whatever the needs or circumstances, we adapt our services and involvement to integrate in the most effective way with any client or organisation. Our goal is to combine the strengths of each party to ensure projects are completed in the most cost effective and efficient manner.

Application of digital technology and innovation

A flexible and pragmatic approach, coupled with technical excellence and expert knowledge, ensures our clients are provided with the highest quality of innovative service in the disciplines of:

- Digital Technologies
- Computer Aided Engineering
- Test and measurement

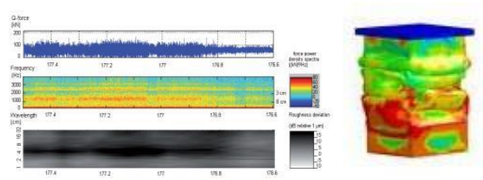
To put it simply, our services are smart people leveraging the combination of data, technology and innovation to deliver better outcomes for our customers and to better deliver projects with certainty.

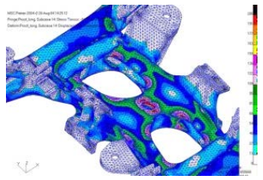
Underpinning our delivery of engineering services is industry leading experience with:

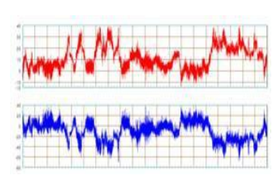
- International and domestic design, performance and safety standards

Rail Industry understanding + **Practical experience** + **In-depth knowledge** + **Engineering best practice** = **Client value and project success**

Rail & Transit







- Finite element analysis, computer aided design and multi-body dynamics simulation
- Use of measured in-service operating loads to determine remaining fatigue life
- Manufacturing surveillance and condition inspections
- Risk based safety-case and asset management approaches

Our experience in predicting, measuring and solving problems relating to vehicle dynamics, gauging and vehicle performance also includes:

- Wheel-rail interface (profiles, conicity, wear, RCF)
- Resistance to derailment and roll-over (dQ/Q, X-factor, Y/Q)
- Ride performance testing
- Track forces measurement

Clients benefit from an effective application of the proprietary and commercial software tools such as Nastran, Patran, LS-Dyna, Vampire, Glyphworks, Gensys and ClearRoute to deliver results.

Aviation

Overview

As a world-leading engineering and project management company, we're always looking to the future and evaluating how best to execute projects that thrive today and will continue to do so tomorrow.

Our teams provide comprehensive end to end project solutions including capital investment, consulting, design, engineering, construction, sustaining capital and operations and maintenance to clients in oil and gas, nuclear, mining and metallurgy, infrastructure and power.

Our Aviation Story

SNC Lavalin Atkins successfully supports an increasing number of clients to achieve their business objectives using our programme management expertise to deliver innovative solutions.

Our teams work collaboratively to harness our extensive global knowledge and deliver high performance for clients across the aviation sector.

Working through trusted long-term partnerships we help our clients create world class airports, making air travel safer, easier and faster.

The airport planning, design, operational and commercial expertise of our teams allows us to plan and manage the phased delivery of airport infrastructure – whether new development or asset renewal – in support of airport and airline clients' business goals and stakeholder expectations. We help deliver intelligent, cost effective and sustainable solutions where passenger travel needs are considered for both today and tomorrow.

- Our integrated services are best in class through our extensive pool of global experience and expertise
- We focus on delivering business outcomes for our clients and our benefits will always be more than our costs
- We constantly challenge ourselves, look to the future and thrive for innovative ideas to turn into reality for our clients
- We are uniquely placed to support our aviation clients in a local, regional and global capacity
- We utilise our globally benchmarked best practice tools and methodologies
- You can be confident that our programme management services will provide you a clear line of sight to success

Why Us

As one of the world's most respected design, engineering and project management consultancies, we bring an unparalleled range of services and the ability to mix these services together to enable airports to transform and grow.

AVIATION ADVISORY
Helping airports face the future in a responsible and sustainable way

AIRPORT MASTERPLANNING
Establishing the needs and potential of airports to optimise developments

DESIGN & ENGINEERING
Providing intelligent solutions that keep airports moving and passengers happy

DELIVERY & OPERATIONS
Helping you get the most from your investments and more from your assets

Our Discriminators

- A global team of airports & aviation industry experts with global capability to deliver service excellence.
- More than 40 years delivering world-class programmes with innovative solutions and outstanding strategies for airports and their aviation partners.
- A full understanding of the complex operating environments of airports.
- Creative and cost-effective solutions that align with clients' goals and aspirations.
- Access to a global resource pool of professionals.

Our Approach

- Achieve alignment and agreement with your capital planning and strategic objectives
- Apply benchmarked best practice methodologies to manage and control the full value chain
- Achieve consistent, repeatable and compliant delivery
- Incubate new digital ideas to simplify and improve our current services and create new solutions and services
- Set the programme up for success with industry-leading contracting and procurement models
- Use technology and data to provide visibility and predictability on schedule and cost trends and forecasts
- Use digital controls and data assurance to drive informed decision making and performance improvement across the value chain
- Manage risks, issues and opportunities in all aspects of programme delivery

Our Services

PLANNING

- Operational Excellence
- Demand Management
- Programme Management
- Optimisation
- Capacity Planning
- Commercial Strategies
- Supply Chain Strategies
- Project Management
- Design Management
- Delivery Strategies/Delivery Partner
- Value Management & Value Engineering

DELIVERY

- Scheduling
- Controls & Governance
- Stakeholder Management
- Resource Management
- Risk, Issues & Opportunities Management
- Change Management
- Commercial & Contract Management
- Management Information Reporting
- Data Management
- Quality Management
- Benefits Realisation
- Asset Management
- Cost & Financial Management
- BIM
- Assurance

Our Design & Engineering Service Model

Designing, developing and executing future-focused solutions has been at the heart of our business since day one. We turn complex programmes from vision into reality for our clients, bringing together people, technology and data every step of the way to drive better outcomes across safety, sustainability and efficiency.

Our capability ensures inclusive, flexible and progressive designs using forecasting, data analysis and strategic business and operations planning. We have a full suite of airfield design capabilities from master planning and concept to detailed design and engineering of pavements, drainage, markings and airfield ground lighting.

Our team has an in-depth knowledge of planning, designing and operating some of the world's biggest, busiest and most customer focused airports.

We have an in-depth understanding of the IT solutions deployed across the typical airport environment. Our experience includes systems development, design, assurance, commissioning, integration, ORAT and into steady state. We blend engineering know-how and technology to generate optimal asset investment plans for clients.

We focus on delivering projects for our clients whilst meeting our promises on performance and growth. It's a plan that's working well for us and we need to stay focused on delivering the transformational projects and infrastructure that matters, helping to create and shape environments where people, communities and businesses thrive.

Airport Cities & Surface Access

It is only when cities and their citizens relate to each other that urban environments can experience resilient growth. Access to air transport is increasingly becoming a central component for shaping that growth. An emerging urban typology, based on time/ cost accessibility, is the Airport City or "Aerotropolis".

Airports & Aviation

From economic studies, operations analysis and master planning to architecture and integrated airport facilities, Atkins embraces every area of design, development, construction and operation.

We provide integrated services for the planning, design and delivery of all aspects of airport development, including:

- Feasibility and planning Feasibility studies and master planning
- Surface access modelling
- Traffic management and operational assessment
- Aviation regulatory advice
- Safeguarding assessment
- Movement area planning and capacity analysis
- Environmental impact studies
- Aviation safety assessments.
- Project delivery Project management
- Risk management
- Contract administration and site supervision
- Airfield pavement & PCI surveys
- CDM services
- Facilities management.
- Design Airside infrastructure – pavements, AGL, NAVAIDS and ATC
- Airport facilities – passenger terminals, cargo terminals, hangars
- Airport systems – baggage handling systems, fire fighting systems, ICT systems including FIDS and CUTE
- Fuel storage and distribution
- Security systems – CULS, ICISS, PASS and more
- Landside infrastructure – motorways, access roads, car parks.

Our Service Delivery Model encompasses the following:

- Local team with international experience
- Our technical and advisory skills are best in class
- We challenge ourselves, look to the future and thrive for innovation
- We have processes and systems in place to deliver excellence
- Our Centre of Excellence for Digital Design Transformation supporting all businesses

Our experience

SNC-Lavalin Atkins has earned its regional and worldwide leadership position in the rail sector through our vast experience of providing expertise and in-depth knowledge to our clients.

We are proud to have developed a trusting relationship with all key metro operators in Asia, and been involved with every major Middle East metro project in the over the past decade. We are the 'go to' consultant for clients in these regions who recognise the value that Atkins can bring to their projects.

From the development and maintenance of existing systems to the implementation of new schemes, we help clients through the entire project lifecycle to ensure that maximum value and outcomes are achieved.

We are well positioned to address the challenges of working in the region, and have vast experience and knowledge of delivering large scale projects to critical deadlines around the world.

Our projects include:

- Cross River Rail, Brisbane
- Crossrail, UK
- Birmingham New Street Station, UK
- Purple Line LRT, Baltimore
- Hong Kong West Rail
- Singapore Metro
- Malaysia KVMRT
- Jakarta ASR
- Hong Kong South Island line
- Parramatta LRT
- Western Sydney Airport Rail Link
- Canberra LRT
- Hong Kong Shatin to Central Link
- Dubai Metro
- Riyadh Metro
- Doha Metro
- KAIA Station
- Etihad Rail, UAE
- Lusail LRT, Doha
- Kuwait Metro
- Sydney Metro
- NGR
- Gold Coast LRT
- Sydney Inner West LRT
- Inland Rail PMO
- Sydney Metro North West
- High Speed Rail 2
- Rolling Stock Development Division (RSD)

The future-proofing of our cities will include the integration of transport, work place and the environment. We understand that rail must be sustainable and customer-focused as a vital part of this equation.

Cross River Rail, Australia

PROJECT DESCRIPTION

Cross River Rail is a 10.2km rail line between Dutton Park and Bowen Hills that includes 5.9 km of twin tunnel under the Brisbane River and Brisbane CBD. The project also includes the construction of four new high-capacity underground stations at Boggo Road, Woolloongabba, Albert Street and Roma Street. In addition, there will be redevelopment of two existing over ground stations at Dutton Park and the Exhibition. Cross River Rail will integrate with the Queensland Rail network and the proposed Brisbane Metro services.

SERVICES PROVIDED

SNC-Lavalin Atkins has been providing operations and maintenance support to the Cross River Rail Delivery Authority (CRRDA) since early 2016 and our engagement comprises:

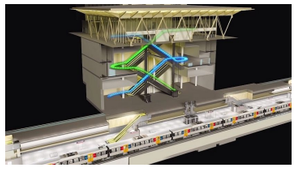
- Strategic rail operational planning, developing service levels, routing and stopping patterns, informing both infrastructure requirements and the future DTMR rail strategy
- Detailed timetable development to validate the operating strategy, validate the ability of infrastructure plans to meet operational, passenger and economic outcomes and drive related activities in transport economics and planning
- The development of a Concept of Operations and Concept of Asset Management capturing Stakeholder requirements for new infrastructure
- Input and advice to management of project risks, controls and scheduling
- Assessment of the fulfillment of freight requirements on the network
- Review of key stabling locations
- Support to CRRDA for the development and refinement of the Operational Readiness Program by working closely with all key stakeholders (CRRDA, TMR and QR) to identify all relevant operational readiness activities, including assistance to the CRRDA to deliver the Operational Readiness Plans and the development of a roadmap of activities to ensure the successful transition to operations.

- Provision of Systems Integration and Assurance services to the CRRDA to develop and implement the SI&A management plans and to oversee and govern CRRDA's integration responsibilities through the identification and integration of the technical and program interface deliverables across CRR primary projects: Tunnel and Stations Development, Rail and Integration Systems and European Train Control Systems.

SNC-Lavalin Atkins developed a program of deliverables that have culminated in the production of staged release of the operations concepts suites. It is essential that Queensland Rail is thoroughly consulted at each stage and their comments reflected iteratively. Where options have presented themselves, we have produced 'decision papers' that provide the client with a quantified discussion to enable determinations to be made. All deliverables to date have been produced on time and within the specified budget. These include a reference timetable for the South East Queensland network and a suite of operations concepts demonstrating how the new assets will be operated and maintained alongside the existing/reconfigured systems.

We maintain an ongoing presence in the CRRDA project offices, establishing, attending and managing critical monthly Interface Committee meetings with all stakeholders to present, review and receive endorsements for rail operation plans and the Concept of Operations.

The team have brought forward a number of initiatives and lessons learned from previous engagements on tunneled infrastructure including Cross Rail 1 and 2, High Speed Two and Sydney Metro. Our combined operational and engineering skills provide the client with a team that have resolved similar issues before. Of particular note has been a drive to minimise infrastructure scope while delivering the required functionality.



CLIENT
Cross River Rail Delivery Authority (CRRDA)

CONTRACT VALUE
A$ 5.5M

CONTRACT PERIOD
2016 - Present

High Capacity Metro Train, Australia

PROJECT DESCRIPTION

CRRC is contracted to design and manufacture new trains for the Melbourne High Capacity Metro Trains (HCMT) project.

SNC-Lavalin's Atkins business (SNCL Atkins) was engaged by CRRC to assist with the bogie design verification requirements, specifically those related to structural and dynamics performance, in line with CRRC's requirements.

SERVICES PROVIDED

- Preliminary dynamic verification, using previous dynamics models developed and track criteria.
- Preparation of a design requirements matrix and design calculation specifications.
- Preparation of physical test procedures for the design validation test program of proof load testing, fatigue life testing and on-track dynamic performance testing.
- Bogie design verification to the HCMT technical specification and the design calculation specifications.
- Witnessing of the physical test program for bogie design verification by proof load testing, fatigue life testing and on-track dynamic performance testing.

The dynamic verification was undertaken with Vampire analysis of bespoke models for the motor and trailer car variants. The structural and durability verifications were undertaken using bespoke system level finite element analysis (FEA) models developed for both the motor and trailer bogie frame variants, the body-to-bogie interface assembly, the axle boxes and axle box attachments.

HCMT SAFETY ASSURANCE

We are delivering system safety assurance activities to support Metro Trains Melbourne in its capacity as Rail Transport Operator for the introduction of new the HCMT to the Melbourne Metropolitan Rail Network (MMRN), and for the introduction of the associated depot stabling facilities at Pakenham East. Our role includes the provision of advice and delivery of safety assurance to support the safety justification being put forward by MTM for the testing of the HCMT vehicles on the MMRN. This advice and safety assurance service also extends to the transfer of the constructed Pakenham East stabling yard to MTM for operation and maintenance of the HCMT in revenue service, and the use of the train simulators, under MTM's rail safety accreditation. In delivering these services, our activities include:

- Providing advice on the structure of safety arguments, including the development of representation by Goal Structured Notation (GSN), and facilitation of stakeholder communication regarding this, including with the Independent Safety sessor (ISA) and the Office of the National Rail Safety Regulator (ONRSR). Preparation for, and assistance in facilitation of, risk workshops and documentation of the output.
- Assistance and advice on the allocation of Safety Integrity Levels (SIL) to train safety functions.

Additional activities include the review of supplier submissions, under the PPP arrangements, for compliance with contracted safety requirements.

CLIENT
CRRC Corporation Limited (CRRC)

CONTRACT VALUE
Confidential

CONTRACT PERIOD
2018 - Present

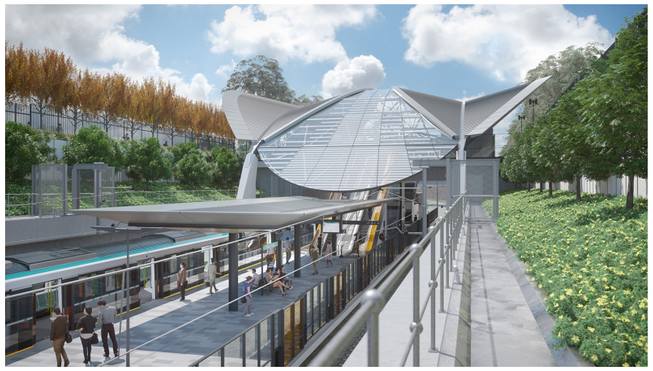
Sydney Metro Northwest, Australia

PROJECT DESCRIPTION

Sydney Metro is Australia's largest public transport project, which will deliver 31 metro stations and more than 66- km of new metro rail to Australia's most populous city.

The new metro railway has a target capacity of around 40,000 customers per hour, which is a similar capacity to other metro systems in the world. This is a significant capacity increase from the current level of 24,000.

Sydney Metro Northwest was formerly known as the North West Rail Link. The A$ 8.3 billion project includes eight new metro stations, five upgraded stations and 4,000 commuter car spaces. It connects the Parramatta and Sydney central business districts which will unlock housing supply and support employment growth between the two CBDs.



Northwest Rail Link

Rapid Transit Integration

SNC-Lavalin's Atkins (SNCL Atkins) business was engaged as the Technical Advisor on DSAPT compliance for the North West Rail Link – Rapid Transit Integration project.

The engagement involved:

- Assessing the rolling stock design for compliance against the requirements of the DSAPT as required by the Disability Discrimination Act (DDA).
- Reviewing design documents, engineering drawings and computer generated fully rendered 'fly-through' animations against DSAPT requirements.
- Reviewing the specification of the mock-up that was provided by the rolling stock supplier to ensure adequate engagement with all necessary stakeholders to satisfactorily demonstrate DSAPT compliance.
- Detailed review and assessment of the mock-up to verify the DSAPT compliance of the design, recommendation for improvements and final approval of the design as meeting the needs of all passengers.

Northwest Rail Link

Human Factors Integration Manager and Independent EMC Expert

Northwest Rapid Transit (NRT), Integrated Management Office/Systems Joint Venture

SNCL Atkins undertook several specialist roles on the Northwest Rapid Transit project including:

- Independent EMC expert between 2016 and 2019.
- Human Factors Integration Manager between 2017 and 2019.

Our specialists reviewed documentation, assessed suitability and appropriateness, provided guidance on compliance and ultimately, supported the successful introduction of the rolling stock into revenue service in 2019.

CLIENT

Transport for New South Wales (TfNSW)

CONTRACT VALUE

Confidential

CONTRACT PERIOD

2016 - 2019

Gold Coast Rapid Transit Project, Australia

PROJECT DESCRIPTION

SNC-Lavalin's Atkins business (SNCL Atkins) worked on a major light rail project on the Gold Coast which launched in July 2014. The Gold Coast Rapid Transit (GCRT) system is a key element of the wider plan to address traffic congestion on the Gold Coast by providing a fully integrated public transport network. The 13km line services 16 stations connecting Gold Coast University Hospital north of Southport with Pacific Fair in Broad beach.

SERVICES PROVIDED

SNCL Atkins contributed to the development of the Public Sector Comparator (PSC) OPEX model, liaised with key stakeholders from the local council, traffic management authorities, and public transport operators ensuring their requirements incorporated in the project scope requirements.

We provided advice on safety and accreditation matters in relation to light rail operations, developed an operating and maintenance strategy for the system. We led the development of the customer service strategy, and provided advice on the procurement and management of the selected consortium. In addition, we carried out an operations-based review of the existing reference project (Concept Design and Impact Management Plan), and contributed to further refinement and optimisation of the intended operations of the system.

We developed an operating and maintenance strategy for the system, worked closely with the commercial advisors on the performance management system. We provided advice on the procurement and management of the selected consortium and on safety and accreditation.

SNCL Atkins were retained to support DTMR and the integrated project team for the delivery of Stage 1, where we worked collaboratively with a wider range of consultants and stakeholders across civil, utilities, traffic and other disciplines. The team worked closely with the PPP Co., the D&C contractor, the O&M contractor and local stakeholders to deliver an operational system for the Gold Coast in 2014.

SNCL Atkins was appointed as Operations Advisor for GCLR Stage 2 building on their role on Stage 1 with particular focus to integrate the new extension on to the existing operational system and extended the payment mechanism for the larger system. Our role included rail systems, rolling stock and leading testing and commissioning witnessing for the State.

BENEFITS PROVIDED

Our extensive light rail experience and business consultancy skills enabled us to provide a balanced blend of management and technical capability delivering benefits for our client and ensuring a seamless operation.

Our continued involvement in the delivery of subsequent stages ensures consistent and experienced advice to the client.

CLIENT

Department of Transport and Main Roads (DTMR)

CONTRACT VALUE

A$ 1B

SNCL ATKINS SHARE

A$ 4.6M

CONTRACT PERIOD

2012 - 2015

New Generation Rolling Stock (NGR), Australia

PROJECT DESCRIPTION

The NGR Project is a Public Private Partnership (PPP) program delivering:

- 75 x 6-car trains manufactured by Bombardier
- One fixed and two mobile simulator platforms
- A maintenance facility
- Supporting infrastructure including stabling yards to South East Queensland

The trains began service in 2017, operated by Queensland Rail and maintained by a private sector consortium (Qtectic) under an availability payment regime.

All NGR trains have been designed for the future installation of the European Train Control System (ETCS), an automatic train protection system, which would safely enable further network capacity increases.

During 2018, the Queensland Government committed funding to redesign and rectify all trains to improve functionality and accessibility in line with the Disability Standards for Accessible Public Transport (DSAPT). The rectification work includes reconfiguration of the following:

> Unisex accessible toilet module to an extended footprint

> The addition of a second unisex toilet module to all trains

> Reconfiguration of seating and allocation of spaces in both accessible cars

> Increasing the number of priority seats throughout the trains

> Improvement of signage and additional handrails

> Redesign of equipment to make it easier to operate for customers with limited dexterity

> Changes to functionality

> The addition of systems for assistance request and information.

SERVICES PROVIDED

- Devising and implementing the project management systems.

- Undertaking assurance activities at sub-suppliers facilities.
- Reviewing, activating and policing the management plans of the PPP Contractor.
- Managing all aspects of the design review process.
- Establishing and maintaining an overseas assurance team in India.
- Managing the planning and execution of the type and routine test program, including First Article Inspection, factory system development, vehicle integration, type and routine testing.
- Conceiving and performing the process by which the PPP contractor demonstrated compliance with the requirements of the operator's safety standards, and providing leadership in the execution of this process.
- Preparing and applying the acceptance processes required to ensure that the contract acceptance criteria were met as assets were presented for acceptance by the principal.
- Direct support to the Availability & Maintenance (A&M) through life support team during the early service period of the NGR fleet to ensure reliability growth and performance development.

Delivery in the PPP environment, brought numerous additional challenges to the traditional technical and project management challenges faced in rolling stock delivery. In particular is the complexity of communication pathways and the challenge of ensuring all stakeholder parties which were adequately informed of progress and status. This required development, implementation and rigorous adherence to, specific processes and procedures for the various delivery activities. These were all custom developed for the specific contracting arrangement under the Queensland Assurance regime.

CLIENT

Department of Transport and Main Roads (DTMR)

CONTRACT VALUE

A$ 4.4B (principal contract)

A$ 18.4M (SNCL Atkins share)

CONTRACT PERIOD

2013 - 2019

Inland Rail, Australia

Programme Management (PMO)

PROJECT DESCRIPTION

Inland Rail is a once in a generation programme that will enhance supply chains and complete the backbone of the national freight network between Melbourne and Brisbane via regional Victoria, New South Wales and Queensland.

Melbourne to Brisbane Inland Rail (Inland Rail) will deliver a step change improvement in rail service quality across the critical North South corridor that is compatible and inter-operable with high productivity train operations in the East West corridor.

The Australian Government has engaged the Australian Rail Track Corporation (ARTC) to develop a 10-year delivery schedule that will see Inland Rail operational in 2025. The Programme is divided into 13 individual projects across 38 local Government areas in Victoria, New South Wales and Queensland.

To lead the delivery of a world class PMO, Turner & Townsend and SNC-Lavalin's Atkins business (SNCL Atkins) have joined forces. These two incredibly experienced organisations have a solid track record of working together, and will provide an integrated PMO for the entire programme. In addition, SNCL Atkins will provide end to end rail technical knowledge of the local Australian market and compliance with all current standards and regulations relating to this complex linear programme.

Our PMO team in Australia is successfully delivering the program in partnership with ARTC to provide centralised control and oversight of the programme, maintain the integrity of component projects through independent assurance, and to ultimately ensure Inland Rail is delivered on time and on budget, operating at a world class level. Our team is providing a scalable service that will promote a collaborative, effective working relationships for the life of the programme.

The PMO has an essential part in making Inland Rail a success. Our PMO will enable the right decisions to be made at the right time and drive performance, not only compliance. We have gained experience in doing this for clients including Brisbane Airport, Sydney Metro and Heathrow Airport. We specialise in setting up and running PMOs, utilise our proven methodologies and robust management systems to deliver a world class PMO for ARTC bringing excellence in controls, governance and assurance.

We have developed a process ensuring that the right people are in the right place at the right time. By taking a structured approach to the initial 90 day mobilisation, we have been able to accelerate the integration of our team with ARTC Inland Rail resources. This was achieved through extensive stakeholder engagement whilst building fully integrated technical processes, systems and tools. We will leave ARTC a lasting programme delivery capability enabled through best-in-class processes, systems and business applications.

The dedicated freight network Inland Rail will transform the freight transportation network between Melbourne and Brisbane, connecting Australia's farms, mines, cities and ports to global markets. It will support Australia's four richest farming regions, providing supply chain benefits and substantial cost savings for producers.

OUR ROLE

- Programme Management and Controls
- Quality and Risk Management
- Systems Integration and Development

ON TRACK WITH INLAND RAIL

- Inland Rail is 1,700km long, from Tottenham (Victoria) to Acacia Ridge (Queensland).
- Trains traveling on the Inland Rail track will travel at speeds of up to 115km/h.
- The track will enable the use of double-stacked, 1,800m long trains with a 21-ton axle load.
- The new rail route will be up to 10 hours faster than the existing coastal rail network via Sydney.

CLIENT

Australian Rail Track Corporation (ARTC)

CONTRACT VALUE

Confidential

CONTRACT PERIOD

2019 - 2025

Parramatta Light Rail, Australia

PROJECT DESCRIPTION

The Parramatta Light Rail project is a key initiative to continue the transformation of Parramatta, supporting growth and renewal in the Western Sydney region. Since 2016, SNC-Lavalin's Atkins (SNCL Atkins) was engaged as the Operations and Fleet Technical Advisor for Transport for NSW (TfNSW) working closely with the client, and in partnership with other technical advisors, initially during the development phase of Stage 1 of the project, subsequently in delivery of Stage 1, and concurrently on the development of the business case for Stage 2.

As Operations and Fleet Technical Advisor, we were required to provide expert advice and support on all operational aspects of the Parramatta Light Rail network, including development the operational strategy; concept of operation and specific technical advice on the rolling stock, asset management, and stabling and maintenance facility.

Parramatta Light Rail Stage 1 will connect Westmead to Carlingford through Parramatta with a dual track light rail network of 12km. This comprises 7km in the existing road corridor and 5km on the existing Carlingford Line rail corridor, replacing the current heavy rail services. The line will include 16 fully accessible stops integrated into the urban environment, with 'turn-up-and-go' services operating 7 days a week from 5 am to 1 am with peak services initially operating every 7.5 minutes. Two sections of the alignment are wire-free, with the fleet of 45m long CAF Urbos 100 LRVs operating under battery power through these sections.

Great River City Light Rail (GRCLR), a consortium of CAF and Transdev was awarded the Supply, Operate and Maintain (SOM) contract in December 2018 with operations scheduled to commence in 2023 with the fleet of 13 LRVs.

SERVICES PROVIDED

- Developing an operational concept for the overall Parramatta Light Rail network.
- Modelling journey time for route alternatives.
- Developing a whole of life operations and maintenance cost model.
- Assisting the development and technical review of the Stage 1 Business Case and Operational Performance Regime.
- Developing and managing a process for the compilation of technical requirements and specifications.
- Assisting the Asset Standards Authority division of TfNSW in the development of the newly created Light Rail standards that are now bound into the Stage 1 Contract.
- Evaluating the EOI submissions.
- Co-ordination and project management of the development of the Scope and Performance Requirements for the Supply, Operate and Maintain (SOM) contract and Infrastructure contract, included authoring the customer, operations, asset management and rolling stock specification.
- Developing the returnable schedule for the SOM work package.
- Developing Management Requirements, Project Plan Requirements.
- Reviewing the integration between the SOM and Infrastructure work packages.
- Developing the Safety Risk Register and Operational Hazard Log.
- Leading the evaluation of the technical submissions for the SOM work package, including detailed technical evaluation of operational performance, systems, depot and stabling aspects of the Proposals.
- Leading the whole of life assessment of the SOM work package.
- Contribution to the development of the Operator Performance Regime.
- Assisting in negotiations with the preferred tenderer.
- Assisting with the finalisation of contract related documentation.
- Leading the technical interface with the LRV supplier within the SOM Contract.
- Developing the Concept of Operations, Maintenance Concept Definition, Operations Concept Definition for Stage 2.
- Assessing journey time for Stage 2 based on developed definition design.
- Assessing stabling and maintenance facility requirements for Stage 2

Image courtesy of NSW government

CLIENT
Transport for New South Wales (TfNSW)

CONTRACT VALUE
A$ 6.0 M

CONTRACT PERIOD
2016 - Present

Canberra Light Rail, Australia

Rail & Transit

PROJECT DESCRIPTION

Canberra Light Rail Stage 1 is a 12-km light railway line linking the northern suburbs of Canberra at Gunghalin with the city centre at Civic. With 13 stops and a journey time of 24 minutes end to end, this new public transport provision has generated significant patronage demand along its length. Commencing operation in April 2019, the light rail network is operated by CMET (a joint venture between John Holland, Deutsche Bahn and Pacific Partnerships).

SNC-Lavalin's Atkins business (SNCL Atkins) commenced its engagement on the project in 2014 with an invitation from then Capital Metro Agency to become part of the operations challenge team. The team was established to review the technical and operations aspects of Stage 1 that were being developed by its Technical Adviser Arup.

The completion of this task led to a successful tender from SNCL Atkins to become the Operations and Fleet advisor on the project in late 2014. As a key player in the development of the scope and performance requirements (SPR) for the project, our employee contributed extensively to the finalisation of the RFP documentation and led the systems evaluation sub-teams for the EOI and RFP aspects of the bid proposals and reviewed and reported on the operations components of the bids.

SERVICES PROVIDED

Throughout the ongoing delivery phase of the project, we have undertaken the following principal tasks:

- An in-depth analysis of the contractual arrangements, including the specifics of sub-system costs and performance regimes
- Review and commentary to IC on design submissions from Canberra Metro covering infrastructure, systems and LRVs
- Provision of expert advice on LRV production compliance with requirements; inspection of production at the CAF facility in Zaragoza, Spain prior to shipment of the first vehicle to Canberra
- Participation in ongoing transport modelling and subsequent of patronage projections
- Provision of input and advice on the project risk plan and risk allocation management for light rail operations
- Provision of advice on safety, security and legal matters as they relate to light rail operations
- Contribute to the development and review of the operator's functional requirements for fleet, systems and infrastructure including alignment, stops, depot, staffing, signalling, etc
- Review and commentary on management plans for the project
- Input to reports to Board and Minister on progress within the Operations arena
- Evaluation of the rolling stock tenders and presenting findings in reports and to the Tender Assessment Committee
- Providing support for tender negotiations
- Design reviews for the LRVs and working to close out issues with the IC and the consortium
- Review of test procedures and test reports for the LRVs.
- Test witnessing (in Zaragoza and Canberra).
- Inspection of vehicles prior to service entry.
- Close-out of issues identified during the delivery phase.
- Review of safety & assurance documentation.
- Ongoing technical support during early operations
- Review of design and testing documentation for special tools, shunters and the Unimog recovery vehicle.

CLIENT
Capital Metro Agency

CONTRACT VALUE
Confidential

CONTRACT PERIOD
2014 - Present

Rail to Western Sydney Airport, Australia

Rail Corridor: Airport Precinct

Fitting the railway into the airport site

PROJECT DESCRIPTION

The Australian Government is building a second major airport in New South Wales, the Western Sydney Airport, which will commence operations in the mid-2020s.

In December 2016, the Department of Infrastructure and Regional Development engaged a consortium of design consultants, led by SNC-Lavalin's Atkins business (SNCL Atkins), to develop the feasibility-level design in addition to the estimates of the cost and construction programs for plausible rail options at Western Sydney Airport.

In March 2018, the NSW and federal governments announced the Sydney Metro Greater West scheme (SMGW), a new metro railway between Schofields and Macarthur to help cater for the population and industry growth of Western Sydney. This growth is being driven by the construction of the Western Sydney International (Nancy-Bird Walton) Airport at Badgerys Creek and the Aerotropolis at Bringelly. Stage 1 of SMGW between St Marys and Aerotropolis is planned to be constructed in parallel with Western Sydney International airport to commence operations in 2026.

We led a consortium to develop a Western Sydney Airport feasibility design, considering a range of likely rail alignments and station designs and configuration options within a pre-defined spatial easement.

Our approach ensured a disciplined yet collaborative, flexible working environment that resulted in an integrated and assured set of design deliverables. The implications of every design element on the overall 'whole-of-life' costs were front of mind in the development of all the options, particularly the implications on operational and maintenance costs.

Building Information Management (BIM) not only played an integral part in the conveyance of complex technical information to internal and external stakeholders, but also was crucial to support the interdisciplinary and safety reviews by SNCL Atkins in addition to the reviews conducted by the various subject matter experts.

Critical elements such as customer movements, levels of service, integration of different modes of transport, integration with airport terminal facilities, integration of technologies, emergency evacuations, station ventilation and customer safety were all considered as part of the development of the design options.

SERVICES PROVIDED

- Feasibility Design Studies
- Impact planning
- Rail Alignment and Tunnel Design
- Operational and Cost Price Estimates
- Environmental and Sustainability Study
- Geotechnical Study
- Rail Systems
- Building Systems
- Rail Operations and Maintenance Plan
- Constructibility Assessment
- Capital Cost Assessment
- Whole of Life Operational and Maintenance cost
- Station Design and Architecture
- Land Impact Planning including interfaces with Roads and Airport
- Migration and Stageworks Considerations
- Safety Assurance and Risk

CLIENT
The Department of Infrastructure, Regional Development and Cities

CONTRACT VALUE
A$ 2.5B

SNCL ATKINS SHARE
A$ 7M

CONTRACT PERIOD
2016 - 2018

Sydney Metro Greater West: North South Link to Western Sydney Airport

Connecting the airport to the network

PROJECT DESCRIPTION

SNC-Lavalin's Atkins business (SNCL Atkins) were commissioned in partnership with Arup to deliver Technical Advisory (TA) services to Sydney Metro as part of the Scoping and Definition Design phases of the Sydney Metro Greater West design process.

The objective of the Scoping Design phase was to identify the preferred options for station precincts, station location/ orientation/typology, alignment, rolling stock, operations, rail systems and constructability to be carried forward to definition design. SNCL Atkins led the optioneering workstream, establishing a process and governance structure to track decision making as well as to coordinate a number of option assessments across the various disciplines of the Technical Advisory team.

A key factor in the success of Scoping Design was the interaction between service providers through a series of workshops and meetings. The Technical Advisory team provided Engineering & Design advice and sought input from other services all of which fed into the optioneering activities. This input related to cost, program, customer and product, environmental, heritage, planning permissions and land use and property options.

The objective of the definition design phase was to ensure the preferred design is constructible, responds to customer needs and supports development of the final business case including completion of the Transport Network Assurance Committee (TNAC) Gate 1 submission. The Definition Design report referenced over 60 technical reports covering the various engineering disciplines within the TA team who contributed to the design.

Sydney Metro Greater West (SMGW) will ultimately provide a direct connection between Schofields and Macarthur linking communities not previously serviced by rail and supporting the growth of western Sydney. SMGW will become the basis of an integrated public transport solution for western Sydney with interchanges with the Sydney Trains network planned for Schofields, St Marys and Macarthur. This state-of-the-art railway will assist in alleviating problems associated with western Sydney's projected growth, whose population is predicted to rise above 6 million in the next twenty years.

SMGW also supports the Greater Sydney Commission's 30 minute city concept, where new infrastructure is focused on providing residents with access to jobs, schools, hospitals and services within 30 minutes of their home.

SERVICES PROVIDED

> Project Management: SNCL Atkins provided key resources to mobilise the full TA team, this included developing the initial P6 program.

> Optioneering: The optioneering workstream was responsible for leading and co-ordinating assessment of over 300 design options across the various disciplines within the Technical Advisory team. SNCL Atkins implemented a process to facilitate the various assessments. Options were identified through a series of workshops led by the SNCL Atkins team, assessment criteria were agreed with the client and assessment results collated and presented for decision making at later meetings.

> Rail Systems Integration: SNCL Atkins led this workstream which covered disciplines such as systems assurance, operations, electrical, communications and signalling-integration of rail systems being a crucial factor in a successful automatic train operations (ATO) environment.

> Stabling and Maintenance Lead: SNCL Atkins identified the preferred site locations from a number of potential stabling and maintenance facility locations and developed a site layout for definition design.

> Rolling Stock Lead: SNCL Atkins led this workstream assessing various rolling stock options.

> Environmental Inputs: SNCL Atkins supported the development and co-ordination of Environmental Impact Statement inputs.

CLIENT
Transport for New South Wales (TfNSW) – Sydney Metro

PROJECT VALUE
A$ 15M
(for Technical Advisory Services)

CONTRACT PERIOD
2018 – 2019

Bangkok Purple Line, Thailand

Bangkok, Thailand

Rail & Transit

PROJECT DESCRIPTION

SNC-Lavalin's Atkins business (SNCL Atkins) provided system engineering and systems integration services to international rolling stock manufacturer Japan Transport Engineering Company (J-TREC) for the design, manufacture and acceptance of 21 three-car metro vehicles on a new railway located in Bangkok, Thailand.

The Bangkok Purple Line Project (PLP) is a 23-kilometre 16 station elevated railway providing the people of northern Bangkok with rapid transport to the centre of the city through connections with adjoining mass transit systems (Blue Line Metro which runs generally East/West and the SkyTrain network).

The Mechanical and Electrical (M&E) contract was awarded in November 2013. Passenger trial runs began in May 2016 and service commenced on 6th August 2016. This tenure of approximately 30 months represents the fastest delivered Asian M&E contract to date.

The major project initiatives include:

- Traction power, including feeders and substation from municipal power to 750VDC (third rail).
- Rolling Stock including train control management system, HVAC, Passenger information and on-board signalling.
- Communications system including station passenger information, PA and advertising, platform screen doors and automatic fare collection.
- Operational Depot with full maintenance services.
- Wayside and in-CAB signalling for Automatic Train Operation (ATO).
- Operational Control Centre (OCC) including train control, emergency management, communications management and centralised maintenance management.

SERVICES PROVIDED

We provided rolling stock systems and integration engineering for the rolling stock provider to the system integrator Marubeni-Toshiba Joint Venture (MTJV). This included:

Systems Integration Management

We provided system integration management to integrate the standardised Japanese metro vehicle into a new railway environment. Including modification to current collection, inclusion of the ATO system and modified dynamic characteristics. The team directly interfaced with all partnered system suppliers and client specified infrastructure.

Systems Engineering

We developed the project's systems engineering approach for the rolling stock and championed its use in accordance to the IEC 15288 standard. We developed a requirements matrix for the purpose of design verification, testing and system validation.

The on-site team championed the process of a significant shift in J-TREC's company philosophy from a build to known design, to a design and build from requirements.

Testing and Commissioning

We led the requirements based documentation development for all testing stages. This included test case production, attendance of testing activities and reporting.

Technology Transfer

SNCL Atkins developed Technology Transfer training material and delivered the training to the operator, BEM, and the network authority MRTV's engineering staff over a full five day training program.

Cab and Interior Design / Human Factors / Ergonomics

The rolling stock required demonstration of the application of sound ergonomic principles. We provided an ergonomic specialist team to guide the rolling stock supplier through the design process through to introduction. This included:

- Authoring of the ergonomic plan based on anthropometric data, local law and legislative requirements, safety considerations and relevant standards
- Independent assessment of the design in accordance with the plan involving inspection of mock-ups and first completed vehicle
- Preparation and submission of relevant assessment reports and maintaining a Design Review Log of ergonomic issues and recommendations
- Ongoing advisory services through commissioning and early service introduction. This included co-developing system modifications

CLIENT

Japan Transport Engineering Company (J-TREC)

CONTRACT VALUE

A$ 210M (principal contract)
A$ 3.8M (SNCL Atkins contract)

CONTRACT PERIOD

2013 - 2016

Transit-oriented development

Transit-oriented development (TOD) refers to development associated with transit stations, where increased density and walkability have been applied to capitalize on the higher numbers of people at transit hubs, creating a virtuous cycle that leads to both higher ridership and greater footfall, with increased desirability to locate residential, commercial, retail and leisure uses.

Successful TOD is a complex process involving planning and design, engineering, government policy and support, organisational development, financial and investment decisions, legal structure and regulation, in-depth real-estate market knowledge, and understanding of user behavior, including rail patronage, property tenants and buyers. TOD can operate at a number of scales and configurations; indeed, there is no one quick-fix formula or approach that suits all places and all projects, but rather a number of models from the Hong Kong-style 'Rail + Property' approach in which the rail operator is also a commercial property developer, to broad-based policy-based examples such as found in Copenhagen.

SNC-Lavalin Atkins is familiar with every aspect of TOD and has worked on projects around the world, from developing approaches for governments and agencies wishing to encourage TOD, through to conceiving and designing individual projects, for all modes of transport including metros and high-speed rail. Our integrated approach means we understand the range of elements required to enable TOD and the intricacies of making it work, such as strategies for increasing retail returns in transport interchanges, or the levers which public authorities can pull to link transport and land-use and catalyse desired outcomes.

Multi-modal interchanges

Multimodal interchanges represent a major opportunity for a railway. Whether it's delivering a new signature station and surrounding masterplan to present a unique gateway to the high speed rail network or a bespoke Transit Oriented Development (TOD), which further supports patronage and revenue generation, we have an integrated multidisciplinary capability specialising in multimodal interchanges. Our team brings together a broad range of skills and expertise, from financial and economic advisory in determining the case for investment, through to planning, design and programme delivery for the new station masterplan.

3 Rail Corridors

25+ sq.m GFA

450 thousand passengers per day

Engineering and Design

Transport Planning

CADRE International TOD Centre, Guangzhou, China

CADRE is one example, being the first fully fledged TOD project for the 13-million person city of Guangzhou, China. Serving high speed rail, intercity rail, two metro lines and various bus services, the development is predicted to handle over 450,000 passenger movements per day. Our design has focused on the efficiency of movement at the same time as maximising value capture for the developer.

CADRE Group Ltd

2014

Cadre International TOD Centre is one example of this transformational new building type. In urban and transport integration terms, it brings together places for people to work and live with East Guangzhou's important transport hub. This project evolves a sustainable model of high density mixed-use development that SNC-Lavalin Atkins have always promoted. It will be China's first fully integrated Transport Orientated Development (TOD) project, keeping SNC-Lavalin Atkins at the forefront of TOD design in China.

Crossrail, London, UK

Crossrail will provide London with a new high capacity West-East railway link. The Central section will be constructed in twin bored tunnels between Paddington in the West and Stratford and Plumstead in the East. The bored tunnels comprise 21km of 6.2mID twin Tunnel Boring Machine (TBM) excavated tunnels beneath Central London. SNC-Lavalin Atkins has been appointed (in JV), to design all the segmentally lined tunnels, undertake assessments of ground movement impact, design the track alignment and permanent way including all track fixed equipment and co-ordinate the underground space within the tunnels.

The main challenges faced were to develop the complex construction methodology and sequencing that could be adopted by the future tunnelling construction contractors and to excavate the bored tunnels beneath the capital whilst minimising impacts on the adjacent buildings, structures and utilities along the route.

SNC-Lavalin Atkins is playing a key role in the delivery of the project through multidiscipline joint venture contracts to design various components and stations in the scheming including Custom House Station and the common architectural component finishes for Paddington, Bond Street, Liverpool Street, White Chapel and Custom House Stations.

21 km tunnels

6 mID

Engineering and Design

Transport Planning

Crossrail Ltd

2017

Birmingham New Street Station

In the early 1960's Birmingham New Street Station was originally rebuilt to accommodate 60,000 passengers a day and the concrete station came to represent the city of Birmingham for many travellers. The redesign of Birmingham New Street transforms the reinforced concrete station into a futuristic transport hub.

17+
hundred thousand passengers each day

Engineering and Design

Transport Planning

In 2008 Network Rail awarded SNC-Lavalin Atkins the detailed design for Birmingham New Street, station, that caters for up to 170,000 passengers each day. During the last seven years, SNC-Lavalin Atkins has played a lead role in the design of the station and the shopping centre Grand Central, overcoming significant challenges by applying innovative solutions to help successfully deliver one of the biggest station refurbishments in Europe.

The project involved the assessment of existing structures and the design of new structures including the new stainless steel façade, the new atrium roof and the steel framed John Lewis building, which is built partly over the 1965 reinforced concrete station. This entailed the building of a Global Stability Analysis Model (GSAM), to understand how the old station and the new constructions would behave under different loadings both in its final state and during key stages of the construction programme. Working closely with Network Rail and Mace, SNC-Lavalin Atkins drew upon their range of multidisciplinary specialists, from civil engineering, highway engineering and architecture, to modelling, telecoms, landscaping and project management to deliver the design for this extraordinary project.

Shatin-Central Link, Hung Hom Station, Hong Kong

SNC-Lavalin Atkins is the lead consultant for the detailed design of the Hung Hom Station and associated tunnels. Services include design of a new major interchange station, modifications to the existing station, reprovisioning of existing operational facilities, 2km of below ground approach tunnels and modifications to existing East Rail stations.

2km below ground

1 milion passagers per day

Engineering and Design

Transport Planning

The new station will provic interchange between the E North-South Line (i.e. exist and intercity services.

A key challenge on the project is the need to lower over 800m of the existing East Rail line (all within the operating rail environment) to allow it to be able to cross the Hong Kong Harbour. A wide range of existing operating facilities must be temporarily and permanently reprovisioned to allow this to happen.

The new interchange station will be required to have almost 1,000,000 people per day pass through it. Extensive modifications to retail facilities have also been required.

MTR Corporation Limited

On-going

South Island Line (East),Hong Kong

The South Island Line (East) (SIL(E)) is a medium capacity railway approximately 7km long with stations at Admiralty (ADM), Ocean Park (OCP), Wong Chuk Hang (WCH), Lei Tung (LET) and South Horizons SOH). It is the first rail corridor on the southern side of Hong Kong Island linking it to the existing Hong Kong Rail Network. The new South Island Line started operating on 28 December 2016, serving the 350,000 residents and workers in Southern District.

1.8km Viaduct

7km long with station

247m Bridge

350 design submissions

SNC-Lavalin Atkins was commissioned in May 2009 to design the two elevated stations at WCH and OCP, in addition to a new 250m Aberdeen Channel Bridge and 1.8km of Viaduct. The works also included the enhancement of Staunton Creek Nullah (a large box culvert), up-grading of slopes, designing complex utility diversions, landscaping, traffic and highways design.

SNC-Lavalin Atkins was awarded the detailed design consultancy C903 comprising two of the five new stations at Ocean Park and Wong Chuk Hang, both elevated. The scope also covered a new 247m bridge spanning the Aberdeen Channel and 1.9km of new elevated viaduct, the enhancement of Staunton Creek Nullah (a large box culvert), up-grading of slopes, designing complex utility diversions, landscaping, traffic and highways design, and other associated works.

Following the award of the 903 Target Cost Works Contract to Leighton, SNC-Lavalin Atkins was further engaged to redesign the viaducts and bridge to suit the contractor's selected erection sequence and pre-stressing configurations.

A key aspect of the design was the management of the approvals process to ensure that all the necessary approvals, consents and permits were obtained to enable the construction works to proceed in accordance with the employer's programme. With over 350 design submissions all requiring approval and/or consent from various authorities, this presented a significant logistical and management challenge which had to be effectively managed to meet the client's implementation programme.

The project won "International Project of the Year" at the British Construction Industry Awards 2017.

MTR Corporation Limited

Transport Planning

On-going

Engineering and Design

This award-winning engineering project was as much an exercise in stakeholder engagement and management, as it was an exemplary design solution. We worked closely with MTR to ensure the project met operational and constructability criteria

Station Improvement Works at MTR Admiralty Station, Hong Kong

75+
hundred thousand
Passengers
per day

4
Interchange
station

Engineering
and Design

Transport
Planning

Design of new interior finishes for Admiralty station public areas, including ticketing concourse, upper and lower platform levels, and entrances, a total wall length of over 2km. The services include condition survey, feasibility study, scheme design, tender drawings and document preparation.

Prior to joining SNC-Lavalin Atkins, the project architects designed the expansion of ADM station to account of date the new SIL and SCL lines. This enhancement of the existing station is to present a holistic upgrade of the whole project

MTR Corporation Limited

2017

All of our work to date has been to facilitate ongoing expansion and improvement in one of the world's busiest underground interchange stations.

Jakarta-Bandung High Speed Rail Corridor, Indonesia

Kereta Cepat Indonesia China (KCIC)

2015 – ongoing

$5.5 billion

SNC-Lavalin Atkins is designing Transit Oriented Development (TOD) masterplans along the new Jakarta-Bandung high speed rail corridor, Indonesia's first high speed rail project. Upon completion in 2019, the route will stretch 142.3 kilometres and stimulate economic growth along the corridor, while reducing traffic congestion in the region.

Our scope of work includes masterplanning, TOD, architecture, urban design, landscape design and station integration for the Halim and Manggarai areas. The aim is to create sustainable development hubs in these areas by incorporating positive social, cultural, economic and community benefits for residents and visitors.

This project relies on TOD opportunities and benefits across a range of stakeholders. SNC-Lavalin Atkins thrived in providing design solutions and assisting in the business proposition of a consortium between the Government of Indonesia and a Chinese Contractor.

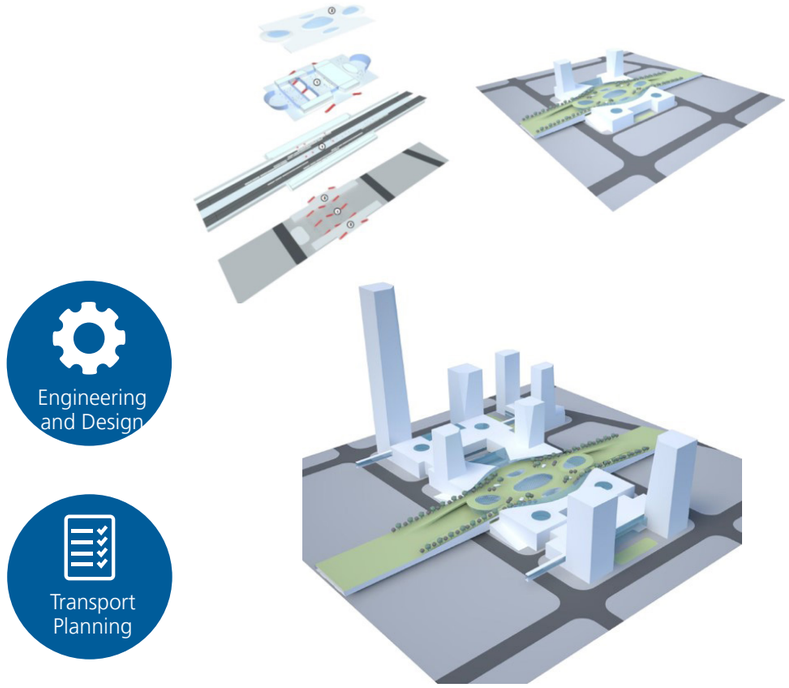
How do we future proof the Connectivity with the city ?

Fusheng High Speed Rail station is the penultimate station on a major high speed rail line, and is located in the suburban area of Chongqing, the major city in the Southwest of China. The transport interchange is a strategic hub which integrates two high speed rail lines, a metro network, long distance coach, local bus and tram services. The high speed rail station project includes an integrated commercial development and is at the heart of the new planned Central Business District of the Longsheng District of Chongqing.

SNC-Lavalin Atkins was commissioned to review and provide guidance, so that the potential for present and future Transit Oriented Development (TOD) was not compromised by the station planning provided by the central government agency. Through inclusive workshops and subsequent design advice, SNC-Lavalin Atkins provided a range of solutions, improving the connectivity of the transport infrastructure to the wider urban plan, maintaining the fundamental civic/transit design drivers and 'future-proofing' the project, so that the TOD could expand over time as a product of economic and social success.

Chongqing Liangjiang New Area (Two River New Zone, TRNZ) Administrative Committee

On-going



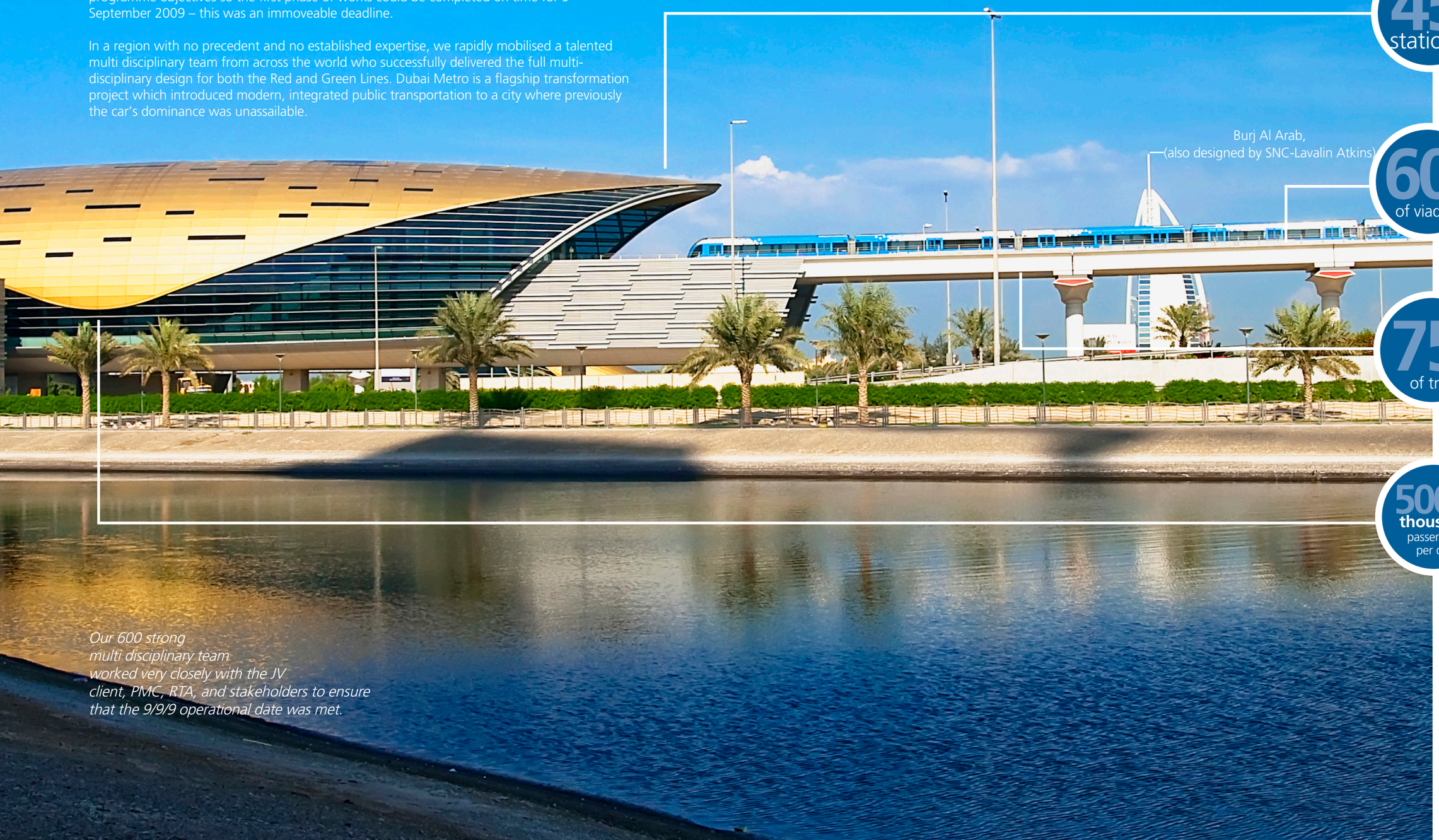
It was exciting to be appointed by the Government to future-proof this HSR transport hub such that the benefit of subsequent TOD at a city scale would not be compromised.

Dubai Metro

This visionary project was the catalyst for the planning and implementation of new metro networks across the GCC region.

SNC-Lavalin Atkins was engaged as the lead designer with an initial remit to recover the programme objectives so the first phase of works could be completed on time for 9th September 2009 – this was an immoveable deadline.

In a region with no precedent and no established expertise, we rapidly mobilised a talented multi disciplinary team from across the world who successfully delivered the full multi-disciplinary design for both the Red and Green Lines. Dubai Metro is a flagship transformation project which introduced modern, integrated public transportation to a city where previously the car's dominance was unassailable.



Our 600 strong multi disciplinary team worked very closely with the JV client, PMC, RTA, and stakeholders to ensure that the 9/9/9 operational date was met.

At over **75km** the Dubai metro network is the longest automated driverless metro in the world

Metro Links

The Dubai Mall footbridge is an excellent example of where SNC-Lavalin Atkins have designed critical links between metro projects and adjacent developments.

This 12-month design and build project was essential in order to give pedestrians safe and air-conditioned passage between Dubai Metro and Dubai Mall.

At 820m-long, the new pedestrian link is the longest automated footbridge in the Middle East and one of the longest in the world.

SNC-Lavalin Atkins was multi disciplinary designer for the main contractor, Dutco Balfour Beatty, and our role included providing Technical Support During Construction.

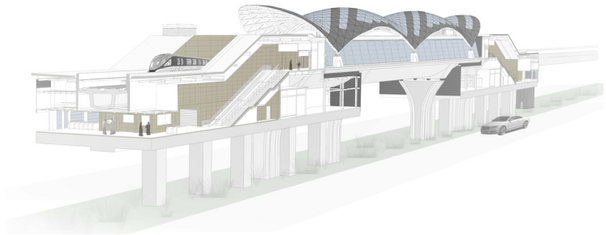
820m
length of the footbridge

65%
of the bridge is covered by travelators

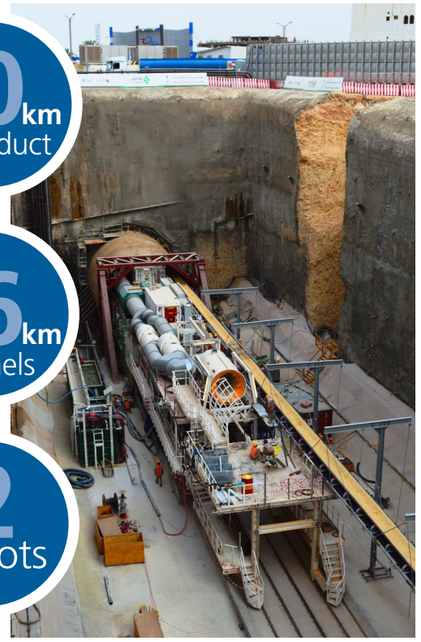
120m
the two longest travelators

This was a fascinating project which has made a dramatic difference for pedestrians in Dubai, who no longer have to negotiate their way across various roads to get to the Mall.

Riyadh Metro, KSA



13 stations



30km of viaduct

26km tunnels

2 depots

Riyadh Metro, currently the largest metro construction project in the world, will reduce congestion and pollution while offering the city's inhabitants sustainable, attractive and fast public transport choices for the first time.

The project includes both underground and elevated stations, depots and ancillary buildings. Solar power is utilised on the system to combat the impact on the environment.

SNC-Lavalin Atkins is lead designer for the FAST Consortium, which is successfully delivering three of the project's six lines.

Our 250-strong multidisciplinary team draws on expertise from offices in Riyadh, the UAE, Bangalore, Hong Kong and the UK.

The partnership approach throughout the FAST Consortium team has been outstanding. We've consistently been first to reach major milestones, from the early works packages for cut and cover tunnels and viaducts to the breakthrough of the first tunnel boring machine.

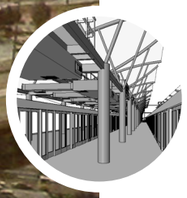
Al Mashaaer Al Mugaddassah Metro
KSA

The Al Mashaaer Al Mugaddassah Metro Project (MMMP) in Saudi Arabia's holy city of Makkah, was constructed to ease public transport between Arafat and Jamarat. The rail system is a mass transit system with a peak of 72,000 passengers per hour per direction and includes nine stations, one depot and 18km of viaduct.

As rail systems design consultant, SNC-Lavalin Atkins was responsible for procuring, managing and coordinating all the rail systems design through to operational readiness. We were also appointed MEP design consultant for all stations and depot works and were the DVE responsible for checking design compliance with the requirements.

The design and build project was completed over a fast-track period of only 22 months, allowing the system to open before the Hajj pilgrimage in late 2010. The typical timeline for a project of this magnitude is more than four years.

9
stations



18km
of viaduct

72,000
passengers per hour into the Holy City of Makkah

22 month
fast-track construction

King Abdul Aziz Road Metro, KSA

This project is part of the overall Makkah Metro and sits within the King Abdul Aziz Road project (KAAR). This project is being developed to regenerate the infrastructure of unplanned areas in Makkah, achieving the vision of urban development to improve residential areas, making the city of Makkah among the world's foremost modern and developed cities. The KAAR project is considered vital in serving the Holy City and its visitors, creating a western gate into the city of Makkah.

The two shell and core metro stations are being constructed ahead of the Makkah Metro due to the programme requirements for construction on the boulevard project. SNC-Lavalin Atkins provided full multi-disciplinary design services for the concept design and the Design and Build tender documentation.

The stations, Haramain Interchange Station, and the Mosque Station, have four 200m platforms for separating boarding and alighting passengers. This will cater for the Hajj and Umrah periods when riderships will rise to 49,000 passengers per hour. Haramain Station which has a 45m deep Line A platform level also was a key challenge in the design of the stations. The 3.5km of cut and cover tunnel sit below the boulevard base car parks which service the large boulevard development.

Developing the planning to ensure that the stations will be safe and comfortable even with the extremely high projected patronage levels was a key challenge in the concept design.

49 of viaduct

45m **thousand** passengers per hour

KAIA High Speed Rail Station, KSA

The King Abdulaziz International Airport High speed Railway Station for Jeddah's expanded airport serves the high-speed rail service linking the cities of Jeddah, Makkah and Madinah, and is part of the Haramain High Speed Rail Line which will operate at speeds up to 320 km/h.

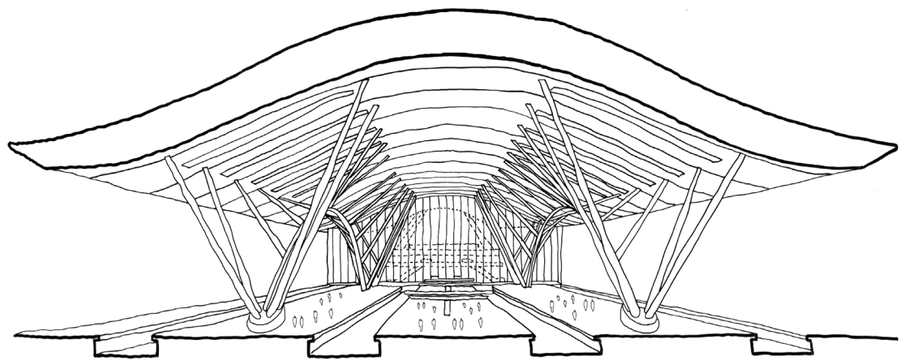
SNC-Lavalin Atkins was appointed as lead designer for the entire airport, one part of this enormous commission included the full multi-disciplinary design services for the preliminary and detail design of the high speed rail station.

Primary features include a 53,000 m² feature roof, supported by a running arch along the platform area with tapered support struts. The fully enclosed 28,500 m² Northern Concourse provides the station with a VIP suite & business class lounges, along with retail and food & beverage areas for passengers. The fully glazed south facade provides passengers with an elevated view over the platform area.

The station is linked to the new passenger terminal building by way of the Transportation Centre, an intermodal transport interchange facility. It is also space-proofed for the future light rail system planned for Jeddah. This light rail line will pass directly through the station at high level over the platform areas.

100,000 m²
floor area

53,000 m²
feature roof



"At over 500m long this LEED Silver station is one of the largest of its type in the world. With such a large enclosure it was crucial to focus upon localised cooling strategies that minimised operational and environmental costs"

Adrian lindon
Director of Arhitecture

450m
platform length

Doha Metro

Red Line South

Our work on the GSAS 4* rated Doha Metro is helping Qatar improve transportation and infrastructure across the city. The programme is critical for the 2022 World Cup and is central in delivering Qatar's 2030 vision.

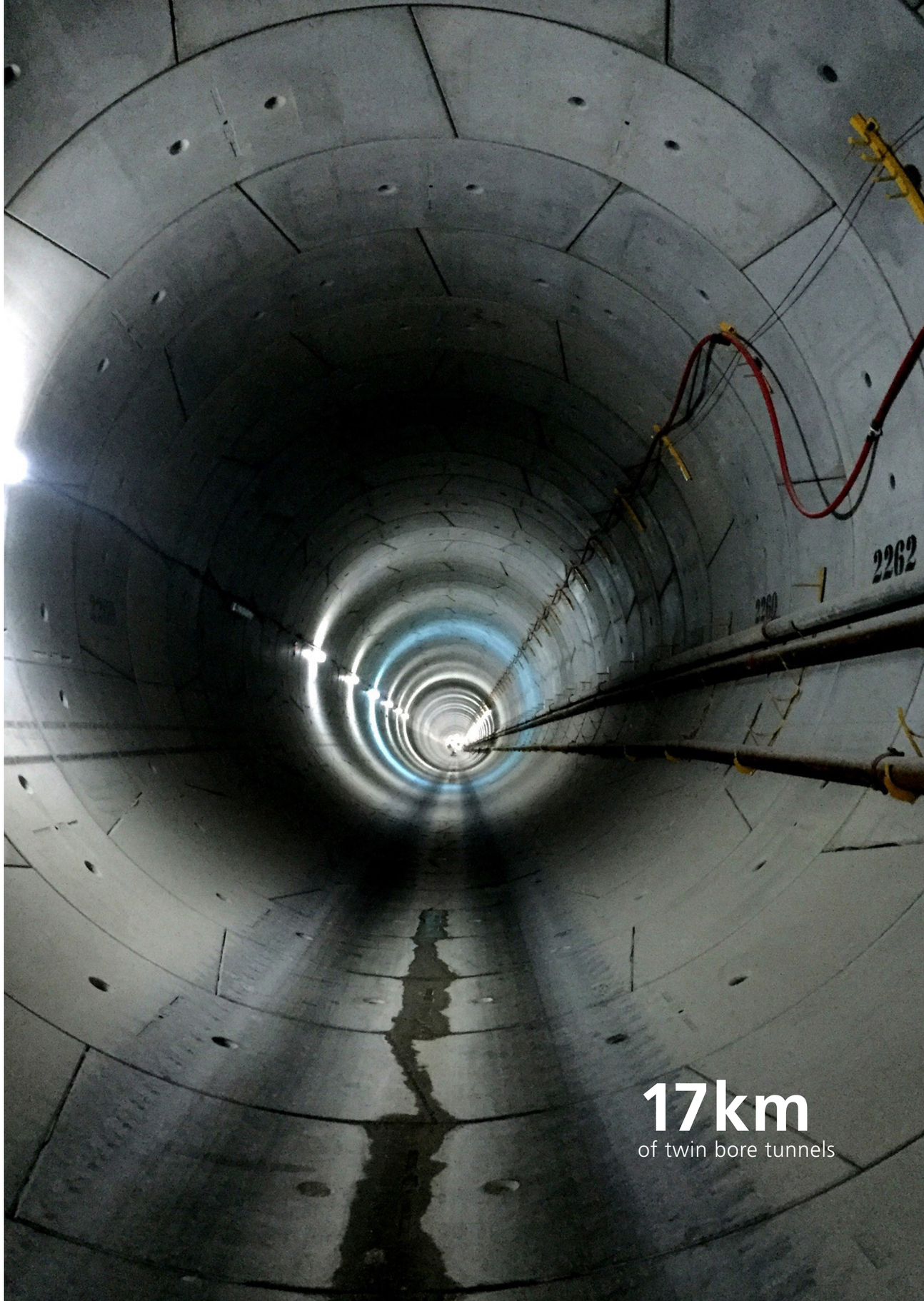
We were appointed as lead designer, working for the QDVC consortium (Qatari Diar/Vinci Construction) to deliver **Red Line South Underground**.

Our multidisciplinary role incorporates everything from architectural design and station planning to the design of twin bore tunnels, fire, life safety strategy, management and systems assurance.

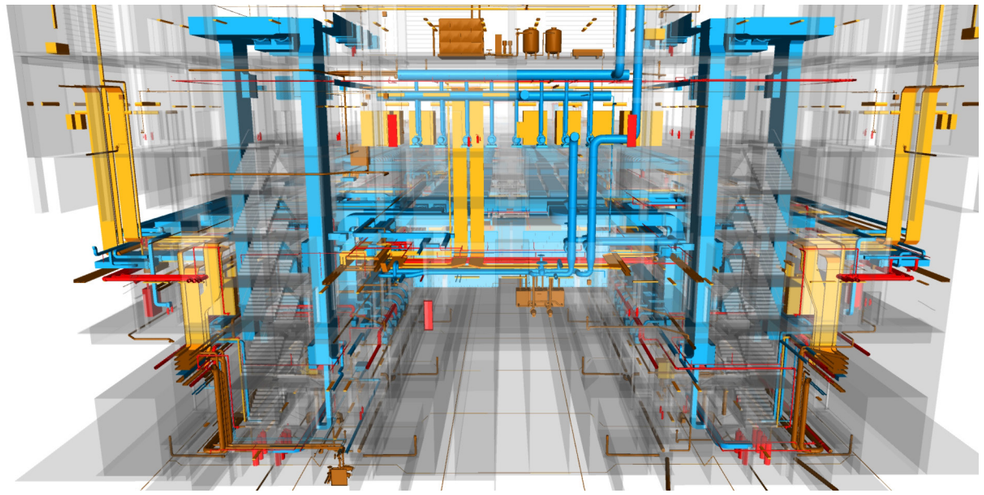
5 Underground Stations

1 Interchange Station

In a dynamic project environment we're absolutely focused on a collaborative approach between all stakeholders. This speeds up decision-making and enables adaptability because everyone is driving towards the same goals.



17km
of twin bore tunnels



We delivered Doha Metro bringing together Design Centres in the UK, India and Hong Kong, and a central Management office in Qatar. Working closely with the Contractor JV, Atkins successfully implemented Value Engineering and change management as part of our design and delivery process.

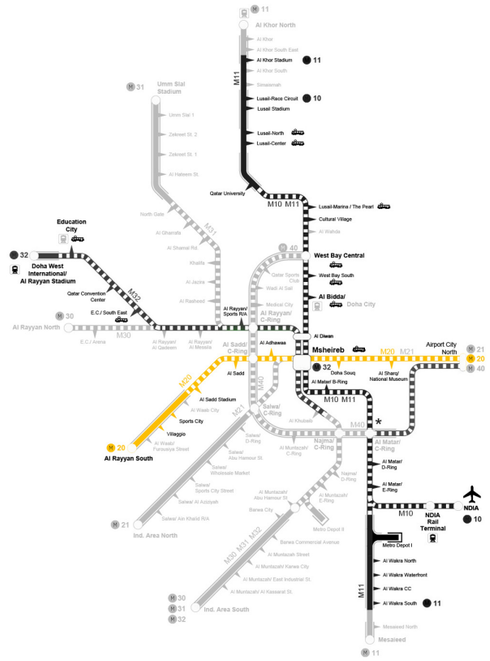
Doha Metro

Gold Line

The £2.5bn GSAS 4* rated Gold Line crosses the city from east to west and is the largest civils package of works to be awarded on Doha Metro. It connects Airport City North to Msheireb Station then extends out towards Muaither, intersecting C-Ring Road and Al Sadd and then follows Al Waab Street towards Villagio and Doha Zoo.

Dilivered from design centres in UK, HK and India, and managed centrally from a project office in Doha, this projects exemplifies the power of BIM as a design tool, and teh ability of well managed teams to deliver results from around the globe.

We were appointed as lead designer, providing multi disciplinary design expertise to the ALYSJ joint venture (Greece's Aktor, Yapi Merkezi and STFA of Turkey, India's Larsen & Toubro and the local Qatari contractor Al Jaber Engineering) to deliver the **Gold Line** Metro stations.



13 Underground Stations

3 Interchange Stations

16km tunnels

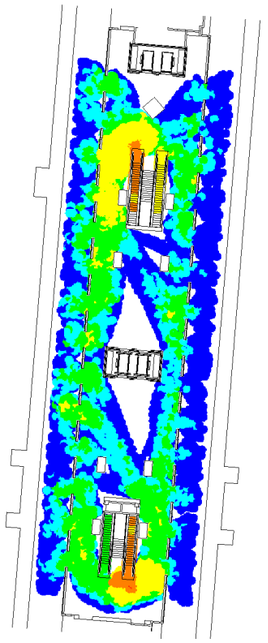
Pedestrian Planning

Developing public spaces that are vibrant and economically sustainable depends on understanding the challenges and solutions to movement in the public realm.

SNC-Lavalin Atkins supports partners and clients throughout Asia Pacific in designing successful places and buildings that meet the needs of all users. Our experience and expertise provides stakeholders with effective movement strategies, where we work together with transport planners, urban designers, architects and engineers to shape, develop and deliver innovative schemes.

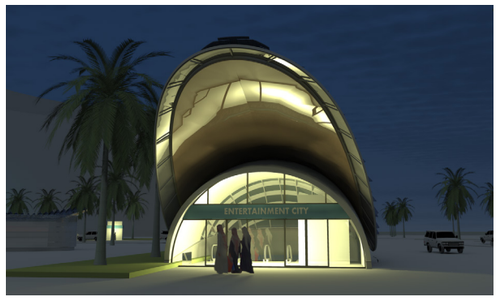
We work throughout the design cycle, from site investigation, to concept design and delivery. By providing efficient, objective analysis we can support the resolution of challenges and inform cost effective design development with respect to:

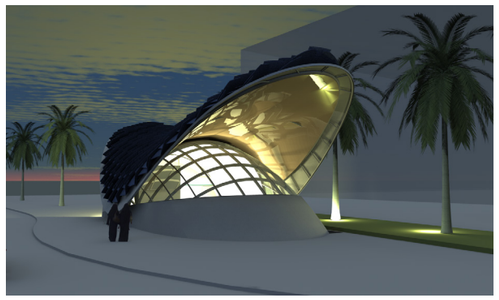
- Movement – providing detailed advice for pedestrian planning. Our advisory services cover the full delivery range from very detailed design of complex buildings, transport nodes and streetscapes, through to strategic masterplans, policy and governance advice at a national scale;
- Information Systems – developing user-driven signage and environmental graphics to support wayfinding and movement, through streetscapes and complex buildings, and;
- Forecasting and Appraisal – supporting design decisions and strategic advice through techniques such as modelling, contingent valuation and systems analysis.



Our transport planners are well versed in a range of planning and design tools, including FATHOM visibility applications and LEGION and VISSIM microsimulation, which serve to optimise the pedestrian experience through design and demonstrate that desirable levels of service and comfort are achieved across all of our projects. I am particularly excited when such tools extend out of the transport arena and into associated commercial property development to predict footfall and usage.

Lusail LRT, Doha

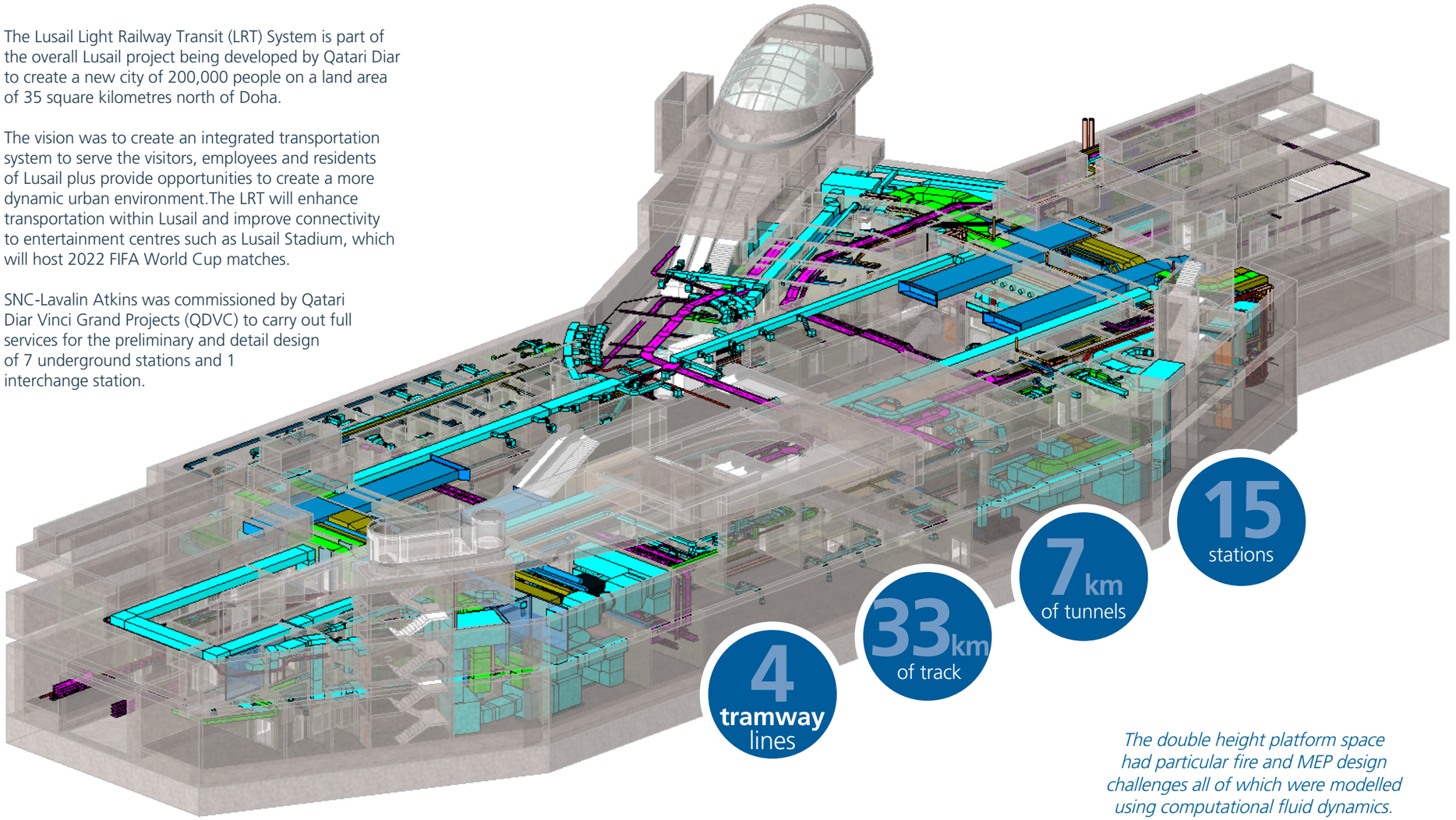




The Lusail Light Railway Transit (LRT) System is part of the overall Lusail project being developed by Qatari Diar to create a new city of 200,000 people on a land area of 35 square kilometres north of Doha.

The vision was to create an integrated transportation system to serve the visitors, employees and residents of Lusail plus provide opportunities to create a more dynamic urban environment.The LRT will enhance transportation within Lusail and improve connectivity to entertainment centres such as Lusail Stadium, which will host 2022 FIFA World Cup matches.

SNC-Lavalin Atkins was commissioned by Qatari Diar Vinci Grand Projects (QDVC) to carry out full services for the preliminary and detail design of 7 underground stations and 1 interchange station.



The double height platform space had particular fire and MEP design challenges all of which were modelled using computational fluid dynamics.

Complete support throughout the project lifecycle

We help our clients throughout the full project lifecycle, from concept through to construction and concession operation. In the UK, we have been involved in the development of high speed rail from as early as 1997, with experience spanning all the high speed rail projects across the country - High Speed 1, 2 and Northern Powerhouse Rail.

High Speed 1, UK

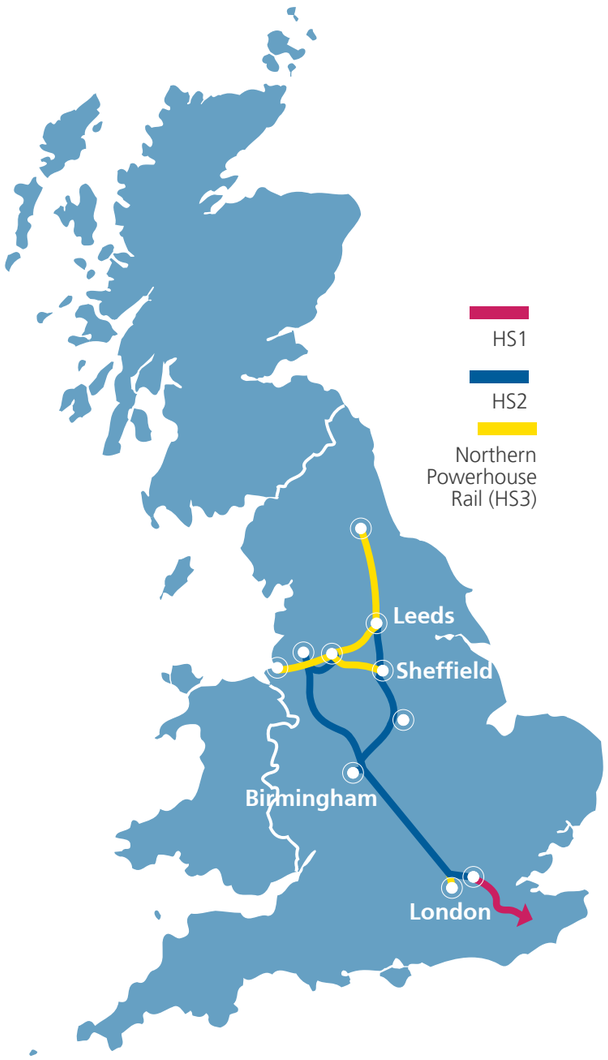
The UK currently has only one stretch of modern high speed railway, High Speed 1(HS1), which links the Eurostar terminal at London's St. Pancras International station with the Channel Tunnel. SNC-Lavalin Atkins' multidisciplinary team has delivered a range of services throughout the lifecycle of the project.

The final construction phase of HS1 was completed in 2007, but SNC-Lavalin Atkins support has continued until 2015.

Eurostar International Ltd and Department for Transport

1997 - 2015

300 km/h



2010

In 2010, the UK government sold the running of the HS1 line and stations to a consortium. SNC-Lavalin Atkins undertook the technical due diligence and provided technical support throughout the sale process. We also acted as Due Diligence and Lenders' Technical Advisor to Eurostar International Ltd in 2010 in the procurement of a new fleet of e320 trains, which provide higher capacity, comfort and reliability, while incurring lower operating costs.

2013

SNC-Lavalin Atkins undertook a comprehensive interim post-implementation review of HS1 for the Department for Transport in 2013. The review examined the evidence for the economic, social and political impact of the new network. Our work was well received, highlighting the benefits realised to date, while emphasising the importance of considering the impacts of transformational schemes, such as HS1, over the long term. Our rigorous work established a comprehensive framework for the evaluation of high speed rail schemes and provided valuable evidence of the benefits delivered by HS1.

2013 to14

From 2013 to14, we worked with Transport for London to review how the line could be extended and tested how an extra high speed service could be operated to a new hub airport for London. This included new lines, new connections and financial modelling.

2014

We provided further support to the UK government on the sale of its share in the Eurostar trains that operate on HS1, which was completed in 2015. SNC-Lavalin Atkins delivered a vendor's due diligence report and supported the Department for Transport throughout the sale. This included new lines, new connections and financial modelling.

Engineering and Design

Operational Planning

Rolling Stock

Cost Modelling

Strategic Advice

Systems and Technical Assurance

Engineering and Design

Transport Planning

Operational Planning

Demand and Revenue Forecasting

Cost Modelling

Environmental Planning

Track & Route Alignment

Systems and Technical Assurance

UK Government
(HS2 Ltd, Department for Transport and formerly Strategic Rail Authority).

2011 – 2016+

c350km/h

High Speed 2, UK

The UK government is planning to build a new high speed railway to connect major cities in Britain. Known as High Speed Two (HS2), the railway is planned in two phases - Phase One, the 230 kilometres between London and Birmingham, and Phase Two, linking Birmingham to Leeds and Manchester.

SNC-Lavalin Atkins helped kick-start the high speed rail debate in the UK with a commission for the UK Strategic Rail Authority in 2001 to develop the business case for high speed links between London, the north of England and Scotland.

SNC-Lavalin Atkins also led the early development of HS2 Ltd's demand and revenue model which underpinned the case for HS2.

Since the government's announcement in early 2012 of its preferred route for HS2 Phase One, SNC-Lavalin Atkins has been part of a large team of engineers and environmental specialists responsible for developing the design of the 230-kilometre route on behalf of HS2 Ltd. SNC-Lavalin Atkins is undertaking two design packages of work on HS2 Phase One, which together give us an involvement in most of the route. In Country South, a 90-kilometre stretch of the route between London and Warwickshire, we are responsible for the civil engineering and structural design of the railway. While in Country North, an 83-kilometre section of the route through Warwickshire, Solihull and Staffordshire, we are carrying out the Environmental Impact Assessment (EIA).

In 2016, SNC-Lavalin Atkins with consortium partners, was appointed as Engineering Delivery Partner for HS2 Phase One, to: undertake tender evaluation of the main works contracts; manage and integrate the design, including BIM compliance; secure local planning consents; undertake environmental assessment and management and manage construction of the railway into operation in 2026.

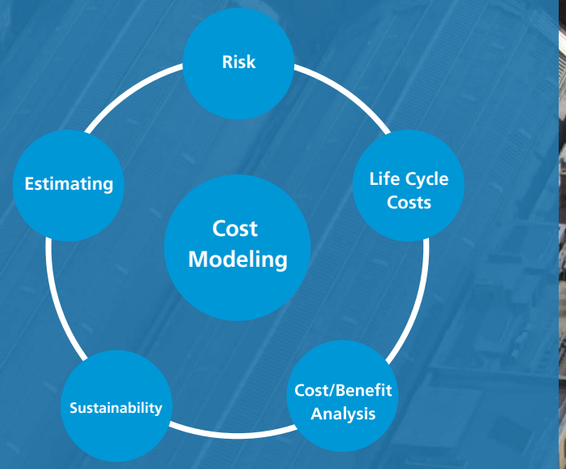
Since 2008, as part of the appraisal and government decision-making process, SNC-Lavalin Atkins has been employed by the UK Department for Transport and Network Rail to assess alternative options for HS2 – examining how the existing network might be used and different choices for HS2 itself. This includes all facets of the potential operation of alternatives and the relative commercial feasibility of HS2. Some of this work is confidential, but most has been published.

We have also been responsible for:

- Preparation of the Hybrid Bill submissions and supporting the Hybrid Bill process through Parliamentary Select Committee since 2014
- Development of HS2's route-wide delivery strategy
- Development of HS2's route-wide BIM strategy and implementation
- Route-wide utilities design and coordination and off-site build design for bridges and structures
- Whole-life costing and value approach (with KPMG)
- Phase One mass-haul strategy
- Historic environment research and delivery strategy

Cost Modelling – Faithful+Gould

Faithful+Gould is a member of the SNC-Lavalin Atkins group of companies. Faithful+Gould's rail expertise spans the entire infrastructure development process. Our experience tells us that each project or programme has unique characteristics, circumstances and challenges.



We tailor these services to the specific needs of our clients, drawing on the knowledge and experience that Faithful+Gould has built up within the rail industry over many years.

With the increase in demand for cost efficiencies, rail infrastructure owners are searching for more accurate means of understanding their expenditure at an earlier stage of development to set budgets that are meaningful and relevant. Cost Modelling provides an added degree of reliability to the estimations of early cost.

Engineering and Design

Cost Modelling

Systems and Technical Assurance

St Pancras, Stratford & Ebbsfleet, UK

Faithful+Gould were commissioned by London and Continental Stations and Property (LCSP) to perform a refresh of the Whole Life Cost Model for St Pancras, Stratford and Ebbsfleet international stations, to establish an equitable charging mechanism, over a 50-year period, for the train operators and retail units based at the station.

In addition, Faithful+Gould has provided LCSP with strategic management consultancy services to help develop an integrated asset management plan incorporating all three stations.

London & Continental Stations & Property

2007

£800 million

Global Experience

FasTracks East Corridor and Northwest Rail (Eagle P3), USA - National Sir
Rail, UK - Birmingham New Street Station, UK - **Doha Metro Gold Line, Qatar** - Baku White City, Azerbaijan - Central Planning Office, Qatar - Cardiff Area Signalling Renewal (CASR), UK - Evergreen3, UK - **Doha Metro Red Line, Qatar** - Stafford Area Improvements Programme, UK - Europe's largest re-signalling scheme, ERTMS, Norway - Copenhagen Metro City Circle Line, Denmark - Crossrail, UK - Farringdon Station, UK - Portland Streetcar Loop, USA Tucson Sun Link Streetcar Development, USA - Great Eastern Mainline Capacity Study, UK - Great Western Rail Franchise, **Cross River Rail, Australia Parramatta LRT, Australia, Western Sydney Airport Rail Link, Australia,** Canberra LRT, Australia **Sydney Metro, Australia, New Generation Rollingstock (NGR), Australia,** Gold Coast LRT, Australia Sydney Inner West LRT, Australia, **Inland Rail PMO, Australia, Sydney Metro North West**, Australia Rolling Stock Development Division (RSD), Australia, UK - Riyadh Metro, **KSA** -Midland Mainline Electrification and HLOS2, UK - Thameslink Southern Great Northern, UK, Norway High Speed Rail, Norway - **Dubai Metro, UAE** Copenhagen-Ringsted New Rail Line, Denmark - Euston Masterplan, UK - Dalmarnock Station, UK - London Underground Bond Street Station Upgrade, UK - Heathrow Airport Tunnels, UK - Edinburgh Glasgow Improvement Program, UK - North, London Rail Infrastructure, UK - Lidingobanan, Sweden - Malarbaban, Sweden - Nanjing NRIET NGTT, China - **Kuwait Metro, Kuwait** - Citybanan Stockholm, Sweden - Las Vegas Bus Rapid Transit Downtown Connector, USA - Southbay Regional Intermodal Transit Center, USA **King Abdul Aziz International Airport Railway Station, KSA** - Pinellas Mobility Initiative USA - Harbin HTK JWJ, China - Central Phoenix/East Valley Light Rail Transit, USA - Shatin to Central Link Cross-Harbour Section, China - Miami Metro Rail, USA - Brunei Land Transport Masterplan, Brunei - **Etihad Rail, UAE** - South Island Line (East), China - West Island Line, China - MARTA, USA - Shanghai Metro Line, China - National Composites Centre, UK - Beijing Metro Line, China - Southend Airport Station, UK - Newport Railway Station, UK - Shanghai Metro Line, China - **Shatin to Central Link Hunghom Station, China** - Beijing National Rail, China - Al Mashaaer Al Mugaddassah Metro Project, KSA - Gautrain Rapid Rail Link, South Africa - Express Rail Link, China - San Francisco Mobility Access and Pricing Study, USA - Decatur MARTA Station Plaza, USA - Shanghai Hengjun, China - **Lusail Light Rail Transit System, Qatar** Taiwan High Speed Rail, China - KCRC, China - Fehmarn Belt Fixed Link, Denmark - Carlsberg Station, Denmark - Bergen Light Rail, Norway - Tampa Bay Intermodal Centers, USA

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